0005

COPY

Incoming
C/025/0005

From: "Chris McCourt" <CMcCourt@altoncoal.com>
To: "Priscilla Burton" <priscillaburton@utah.gov>
CC: "Daron Haddock" <daronhaddock@utah.gov>, "Pete Hess" <petehess@utah.gov>...
Date: 2/5/2009 4:22 PM
Subject: Alton Coal Development - C/025/0005, Supplemental Information for Mining and Reclamation Plan Deficiencies Submittal December 22, 2008
Attachments: Supplemental Information C1&C2 Form.pdf; Chapter 1 Text Edits Version.pdf; Chapter 2 Text Edits Version.pdf; Chapter 3 Text Edits Version.pdf; Chapter 4 Text Edit Version.pdf; Chapter 5 Text Edits Version.pdf; Coal Hollow Chapter 7 Text Edit Version.pdf

Priscilla,

Attached are PDF files of the supplemental information you requested yesterday for the Mining and Reclamation Plan Deficiencies Submittal provided on December 22, 2008. The attached files show the line by line changes to the main text in each chapter that was provided in the original submittal. A revised C2 form is also included that briefly summarizes the information provided on the colored sheets.

Four copies of this submittal will be sent to the Division office in Salt Lake City along with two copies to your office in Price.

Please let me know if you have any questions or if we can be of further assistance.

Sincerely,

Chris McCourt

Manager

Alton Coal Development, LLC

(435) 867-5331

File in:
C0250005 2009 Incoming
Refer to:
☐ Confidential
☐ Shelf
☒ Expandable
Date 020509 for additional information

Alton Coal Development, LLC
463 North 100 West, Suite 1
Cedar City, Utah 84720
Phone (435) 867-5331 • Fax (435) 867-1192

COPY

February 5, 2009

Daron R. Haddock
Department of Natural Resources
Utah Division of Oil, Gas & Mining
1594 West North Temple, Suite 1210
Salt Lake City, UT 84114

Re: Supplemental Information for the Mining and Reclamation Plan Technical Review Deficiencies submitted December 22, 2008 Coal Hollow Project, Kane County, Utah, C/025/0005

Dear Mr. Haddock:

As requested by the Division on February 4th, Alton Coal Development is providing supplemental information for the Technical Review Deficiencies submitted on December 22, 2008. In addition to the colored sheets that are provided in the original submittal which provide details related to instructions and changes, .PDF files are now submitted that document the line by line changes to the main sections of text for each chapter provided in the submittal. Also, a revised C2 form which summarizes the information provided on the colored sheets in the original submittal is also included at the request of Division staff.

Included are four copies of the C1 and C2 forms along with four computer disks containing the text edit files for each chapter.

Please let me know if there is any other assistance that we can provide.

Sincerely,

Chris R. McCourt, PE

APPLICATION FOR COAL PERMIT PROCESSING

COPY

Permit Change ☐ New Permit ☒ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: Alton Coal Development, LLC

Mine: Coal Hollow **Permit Number:** C/025/0005

Title: Supplemental Information for Mining and Reclamation Plan - Technical Review Revisions submitted 12/22/08

Description, Include reason for application and timing required to implement:

As requested, supplemental C1/C2 forms are being submitted along with files providing edits to the main text

Instructions: If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

☐ Yes ☒ No 1. Change in the size of the Permit Area? Acres: _____ Disturbed Area: _____ ☐ increase ☐ decrease.
☐ Yes ☒ No 2. Is the application submitted as a result of a Division Order? DO# _____
☐ Yes ☒ No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
☐ Yes ☒ No 4. Does the application include operations in hydrologic basins other than as currently approved?
☐ Yes ☒ No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes ☒ No 6. Does the application require or include public notice publication?
☒ Yes ☐ No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
☐ Yes ☒ No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
☐ Yes ☒ No 9. Is the application submitted as a result of a Violation? NOV # _____
☐ Yes ☒ No 10. Is the application submitted as a result of other laws or regulations or policies?
Explain: _____
☒ Yes ☐ No 11. Does the application affect the surface landowner or change the post mining land use?
☐ Yes ☒ No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
☒ Yes ☐ No 13. Does the application require or include collection and reporting of any baseline information?
☐ Yes ☒ No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
☒ Yes ☐ No 15. Does the application require or include soil removal, storage or placement?
☒ Yes ☐ No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
☒ Yes ☐ No 17. Does the application require or include construction, modification, or removal of surface facilities?
☒ Yes ☐ No 18. Does the application require or include water monitoring, sediment or drainage control measures?
☒ Yes ☐ No 19. Does the application require or include certified designs, maps or calculation?
☐ Yes ☒ No 20. Does the application require or include subsidence control or monitoring?
☐ Yes ☒ No 21. Have reclamation costs for bonding been provided?
☒ Yes ☐ No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
☒ Yes ☐ No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you. (These numbers include a copy for the Price Field Office)

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Chris McCourt
Print Name

[signature], Manager, 2-5-09
Sign Name, Position, Date

Subscribed and sworn to before me this 5 day of Feb, 2009

Catherine Stucki
Notary Public

My commission Expires: 5/26, 2010
Attest: State of Utah } ss:
County of Iron

NOTARY PUBLIC
CATHERINE STUCKI
7181 S. CAMPUS VIEW DR
WEST JORDAN, UTAH 84084
COMMISSION EXPIRES
MAY 26, 2010
STATE OF UTAH

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

Form DOGM- C1 (Revised March 12, 2002)

COPY

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Alton Coal Development, LLC
Mine: Coal Hollow **Permit Number:** C/025/0005
Title: 1-Supplemental Information for Mining and Reclamation Plan - Technical Review Revisions submitted 12/22/08

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

Add	Replace	Remove	DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒	☐	☐	Volume 1, Chapter 1: Appendix 1-7, County Road 136 (K3900) Approvals and Agreements
☒	☐	☐	Volume 1, Chapter 1: Drawings 1-5 and 1-6
☐	☒	☐	Volume 1, Chapter 1: Appendix 1-5 Proof of Publication
☐	☒	☐	Volume 1, Chapter 1: Table of Contents and Text
☐	☒	☐	Volume 1, Chapter 1: Drawings 1-1, 1-2, 1-3 and 1-4
☐	☒	☐	Volume 1, Chapter 1: Appendix 1-4 Certificate of Liability Insurance
☒	☐	☐	Confidential Volume 7, Appendix 1-2: Roger Pugh and Margaret Moyers Mineral Leases
☐	☒	☐	Volume 1, Chapter 1, Appendix 1-3: Exhibit 3 Map
☐	☒	☐	Volume 1, Chapter 2: Table of Contents and pages 21 through 29
☒	☐	☐	Volume 1, Chapter 2, Appendix 2-1, Appendix C: Cover Page
☐	☒	☐	Volume 1, Chapter 2, Appendix 4-1, Chapter 4: Pages 4-1 through 4-6
☐	☒	☐	Volume 1, Chapter 2, Appendix 2-1, Chapter 5: Page 5-3
☐	☒	☐	Volume 1, Chapter 2, Appendix 2-1, Appendix C: Soils Analysis C0704226 and C07041141
☐	☒	☐	Volume 1, Chapter 2: Drawings 2-1 and 2-2
☐	☒	☐	Volume 2, Chapter 3: Table of Contents and Text pages 3-34 through 3-80
☒	☐	☐	Volume 2, Chapter 3: Appendix 3-5 Alton Sage Grouse Habitat Mitigation Plan
☐	☒	☐	Volume 2, Chapter 3: Drawings 3-1, 3-2, 3-3, 3-4 and 3-5
☐	☒	☐	Confidential Volume 7, DWR Raptor Survey: Drawing 3-6
☐	☒	☐	Volume 2, Chapter 4: Table of Contents and page 4-10
☒	☐	☐	Confidential Volume 7, Appendix 4-1 Cultural Resources: 42Ka2044 Excavation Summary
☒	☐	☐	Volume 2, Chapter 4: Appendix 4-5 Fugitive Dust Control Plan
☐	☒	☐	Volume 3, Chapter 5: Table of Contents and Text
☐	☒	☐	Volume 3, Chapter 5: Appendix 5-1 Geotechnical Analysis
☐	☒	☐	Volume 3, Chapter 5: Appendix 5-2 Sediment Impoundment & Diversion Structure Analysis
☒	☐	☐	Volume 3, Chapter 5: Appendix 5-4 Blasting Plan
☒	☐	☐	Volume 3, Chapter 5: Appendix 5-5 Reclaim Slopes Stability Evaluation/Analysis
☐	☒	☐	Volumes 3 & 4, Chapter 5: Drawings 5-1 through 5-39
☒	☐	☐	Volumes 3 & 4, Chapter 5: Drawings 5-8A, 5-8B, 5-8C, 5-20A, 5-21A, 5-22A through 5-22G, and 5-37A

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	Received by Oil, Gas & Mining
This supplemental C2 form is provided in addition to the colored sheets provided in the original submittal, as requested by DOGM. The colored sheets provide details for each of the revisions provided in the Technical Review Revisions submission on 12/22/08. This C2 form summarizes the information provided on the colored sheets.	

COPY

APPLICATION FOR COAL PERMIT PROCESSING

Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: Alton Coal Development, LLC

Mine: Coal Hollow **Permit Number:** C/025/0005

Title: 2-Supplemental Information for Mining and Reclamation Plan - Technical Review Revisions submitted 12/22/08

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☐ Add	☒ Replace	☐ Remove	Volume 5, Chapter 6: Drawings 6-1, 6-2, 6-5 and 6-9
☐ Add	☒ Replace	☐ Remove	Volume 5, Chapter 6: Appendix 6-2 Sample Identification Table
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7: Table of Contents and Text
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7: Tables 7-4, 7-5, 7-6 and 7-7
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7, Appendix 7-1: Cover page, Signature page, page 48 and figure 18
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7, Appendix 7-1: Appendix B
☒ Add	☐ Replace	☐ Remove	Confidential Volume 7: Appendix 7-8 Water Rights Agreement with the Town of Alton
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7: Drawings 7-1, 7-2, 7-3, 7-10, 7-12 and 7-14
☒ Add	☐ Replace	☐ Remove	Volume 6, Chapter 7: Drawings 7-5, and 7-6
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7, AVF Appendix: cover and signature pages, page 1 and pages 31 to 39
☒ Add	☐ Replace	☐ Remove	Volume 6, Chapter 7, AVF Appendix: Figures 13/14 and Plate 5
☐ Add	☒ Replace	☐ Remove	Volume 6, Chapter 7, AVF Appendix: Plates 3 and 4
☐ Add	☐ Replace	☐ Remove	
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Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.	**Received by Oil, Gas & Mining**
This supplemental C2 form is provided in addition to the colored sheets provided in the original submittal, as requested by DOGM. The colored sheets provide details for each of the revisions provided in the Technical Review Revisions submission on 12/22/08. This C2 form summarizes the information provided on the colored sheets.	

CHAPTER 1

R645-301-100. GENERAL CONTENTS

110 LEGAL, FINANCIAL, COMPLIANCE, and RELATED INFORMATION

110 INTRODUCTION

Alton Coal Development, LLC is submitting a Mining and Reclamation Plan for the Coal Hollow Project to the Utah Division of Oil, Gas and Mining pursuant to rules governing coal mine permitting at R645-301-100 et seq. Permit Area Base Drawing – Drawing 1-1.

112 IDENTIFICATION OF INTERESTS

112.100 Business Entity

Applicant, Alton Coal, LLC, is a limited liability company duly organized and validly existing under the laws of the State of Nevada, and authorized to conduct business under the laws of the State of Utah.

112.200 Permit Applicant and Permittee:

Alton Coal Development, LLC
463 N. 100 W, Suite 1
Cedar City, UT 84720
Telephone (435) 867- 5331
Employer I. D. #42-1655092
Social Security numbers of Alton Coal Development, LLC's members and manager provided in "CONFIDENTIAL BINDER"

112.210 Operator:

Alton Coal Development, LLC
463 N. 100 W, Suite 1
Cedar City, UT 84720
Telephone (435) 867- 5331
Employer I. D. #42-1655092

112.220 Resident Agent:

Corporation Trust Company of Nevada
6100 Neil Road
STE 500
Reno, NV 89511

For Utah:

Chris R. McCourt
463 N. 100 W., Suite 1
Cedar City, Utah 84720
(435) 867-5331

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Chapter 1 1/10

112.230 Abandoned Mine and Reclamation Fee

Robert C. Nead, Jr. will pay the abandoned mine land reclamation fee.

Deleted: Alton Coal Development, LLC, is the sole party in interest and

112.300 Ownership and Control

Alton Coal Development, LLC, is the sole party in interest, owning and controlling this application.

112.310 Members and Managers of Alton Coal Development, LLC

Social Security numbers of Alton Coal Development, LLC's members and manager provided in "CONFIDENTIAL BINDER" Appendix 1-1

Manager -	CHRIS R. MCCOURT 1461 N. 3775 W. Cedar City, UT 845720
Member	STONIE BARKER, JR 714 Bob White Lane Naples, FL 34108
Member	BEVERLY HOLWERDA 960 Cape Marco Drive Marco Island, FL 34145
Member	ROBERT C. NEAD, JR 6602 Ilex Circle Naples, FL 34109
Member	JAMES J. WAYLAND 2841 Capistrano Way Naples, FL 34105

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All members and managers use the employer identification number of Alton Coal Development, LLC No. 42-1655092

112.320 Relationship to the Applicant

Each of the above-listed managers and members owns and controls more than 10% of Alton Coal Development, LLC. The following is a listing of company ownership as defined by R645-100-200 "Owned or Controlled":

Stonie Barker, Jr.:	10% Ownership
Beverly Holwerda:	30% Ownership
Robert C. Nead, Jr.:	11% Ownership
James J. Wayland:	40% Ownership

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Chapter 1 1/10

112.330 Title and Date of Position

The manager listed in 112.310 was appointed July 17, 2007. The members listed in 112.310 were appointed as of September 9, 2004.

112.340. Ownership or control of Other Coal Mining and Reclamation Operations

Neither Alton Coal Development, LLC nor its manager or members owns and has not in the previous five years owned another coal mining and reclamation operation.

112.350 Application Number – Other Pending Coal Mining and Reclamation Operations

Neither Alton Coal Development, LLC nor its manager or members owns any pending coal mine permits.

112.400 Coal Mining and Reclamation Operations Owned or Controlled

Neither Alton Coal Development, LLC nor its manager or members owns or controls any other coal mining and reclamation operations.

112.410 Coal Mining and Reclamation Operations Owned or Controlled by Managers or Members of Alton Coal Development, LLC

Neither Alton Coal Development, LLC nor its manager or members owns or control any other coal mining and reclamation operations.

112.420 Ownership and Control Relationship of Managers and Members of Alton Coal Development, LLC

Each of the managers and members listed at § 112.320 own or control more than 10% of Alton Coal Development, LLC

112.500 Legal or Equitable Owner of the Surface and Mineral Properties

The legal and equitable owners of the properties to be affected by this mining operation during the duration of the permit period along with legal descriptions are included in this section. Surface and coal ownership are also shown on Drawings 1-3 and 1-4. The following table is a summary of the ownership within the Permit boundary.

Deleted: surface and mineral

Deleted: shown below.

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Permit Area Ownership (Acres)**				
	Fee	Federal	State	Total
Surface	635	0	0	635
Coal*	435	200	0	635
Total				

Note*: Federal minerals located within the Permit area are not planned for mining as part of this application. These areas have been included as part of the LBA application described in 112.800.
Note**: Acreages are approximate based on legal descriptions

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Chapter 1 1/10

The legal description for lands included within the Permit Boundary is provided below for each surface owner.

SURFACE OWNERSHIP:

Owner/Lessor:	*Lessee:*
C. Burton Pugh 533 N 650 E Lindon, Utah 84042-1567 801-785-6220	Alton Coal Development, LLC

Legal Description (C. Burton Pugh Property):

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 30: All of Section Lot #1 (NW¼ NW¼); NE¼ NW¼ ; N½ NE¼ ; ALSO: BEGINNING 3.50 chains West of the East Quarter corner of Said Section 30, and running South 34° 34' West 22.64 chains to the 1/16 section line; thence West 2.64 chains to the Southwest corner of NE¼ SE¼ of Said Section 30; thence North 40.00 chains; thence East 20.00 chains; thence South 14.69 chains; thence southwesterly to the point of beginning

....containing 217.64 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 29: BEGINNING at the Northwest corner of Said Section 29, and running thence South 34.69 chains; thence North 33°22' East 35.50 chains; thence North 40° West 0.58 chains; thence North 37°30' East 12.30 chains; thence West 22.23 chains to the point of beginning.

....containing 36.04 acres, more or less.

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 19: SW¼SE¼, E½SE¼, SE¼NE¼

....containing 160.0 acres, more or less

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 20: SW¼

....containing 160.0 acres, more or less

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Chapter 1 1/10

COAL OWNERSHIP:

Owner/Lessor: *Lessee:*

C. Burton Pugh
533 N 650 E
Lindon, Utah 84042-1567
801-785-6220

Alton Coal Development, LLC

Roger M. Pugh
140 South 100 West
Kanab, UT 84741

Deleted: , Attorney in

Deleted: Fact & Power of Attorney for
Verna H. Pugh
116

Mark and Margaret Moyers
9397 Avanyu Drive
Pleasant Grove, UT 84062

Deleted: Kanab, Utah

SURFACE OWNERSHIP:

Owner/Lessor: *Lessee:*

Alecia Swapp Dame Trust
Through Richard, Trustee
1620 Georgia Ave.
Boulder City, NV 89
702-293-4773

Alton Coal Development, LLC

Legal Description (Alecia Dame Swapp Trust):

TOWNSHIP 39 SOUTH-RANGE 05 WEST, SLB&M
Section 30: BEGINNING at a point 5.31 chains North of the E¼ corner of Said Section 30, and running thence South 45.31 chains; thence West 20.00 chains; thence North 20.00 chains; thence East 2.64 chains; thence North 34° 34' East 22.64 chains to the 1/16 section line; thence North 33° 22' East to the point of beginning.

....containing 61.96 acres, more or less.

COAL OWNERSHIP:

Owner/Lessor: *Lessee:*

Alecia Swapp Dame Trust
Through Richard, Trustee
1620 Georgia Ave.
Boulder City, NV 89
702-293-4773

Alton Coal Development, LLC

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Chapter 1 1/10

112.600 Owners of Record of Property Contiguous to Proposed Permit Area

Owners of surface properties contiguous to the proposed permit area are shown on Drawing 1-3 and the name and address of each such owner is as follows:

Department of the Interior, Bureau of Land Management
District and Regional Office
Salt Lake City, Utah

Darlynn and Arlene Sorensen
Orderville, Utah
435-648-2462

112.700 MSHA Numbers

The MSHA Mine Identification Number for the Coal Hollow Project is 42-02519.

112.800 Interest in Contiguous Lands

The applicant has interest in lands contiguous to the permit area. A Lease by Application (LBA) is currently being processed by the United States Department of the Interior, Bureau of Land Management, Salt Lake City, Utah.

Alton Coal Development, LLC, the sole party in interest, submitted the LBA application in September, 2004. The LBA is contiguous to the permit area and contains approximately 3,581 acres. See Drawing 1-2 for LBA delineation.

In addition to the LBA application, Alton Coal Development, LLC also has property leased from C. Burton Pugh located east of the permit boundary. This property which is contiguous to the permit area, is part of a land tract (9-5-20-2) owned by Mr. Pugh that is split across the permit boundary and is located in Section 20, Township 30 South, Range 5 West. This entire tract was leased prior to the final determination of the Permit Boundary (9/10/04). The area leased from Mr. Pugh outside the Permit Boundary are not planned for development except for approximately 43 acres located in the SW¼, NW¼ Section 20 which is included as part of the LBA application. The 43 acres would possibly be developed for surface coal mining operations if the LBA mining rights are successfully acquired. Land tracts leased by Alton Coal Development, LLC within and contiguous to the permit area are identified on Drawing 1-3.

112.900 Certification of Submitted Information

After Alton Coal Development, LLC is notified that the application is approved, but before the permit is issued, Alton Coal will update, correct or indicate that no change has occurred in the information submitted under R645-301-112.100 through .800.

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113 VIOLATION INFORMATION

Neither the applicant, affiliates, members or managers or persons controlled by or under common control with the applicant has: (i) had a federal or state mining permit suspended or revoked in the last five years; (ii) nor forfeited a mining bond or similar security deposited in lieu of a bond; (iii) nor received a violation during the last three year period.

114 RIGHT OF ENTRY INFORMATION

Applicant bases its right to enter and begin coal mining activities in the permit area and the consent of the surface owner to extract coal by surface mining methods upon the following documents:

Lessor: C. Burton Pugh — *Lessee:* Alton Coal Development, LLC
Surface and Mineral Lease, dated 9/10/04; originally recorded 5/25/06

Lessor: Roger M. Pugh — *Lessee:* Alton Coal Development, LLC
Mineral Lease, dated 9/11/08; recorded 9/11/08

Lessor: Margaret and Mark Moyers — *Lessee:* Alton Coal Development, LLC
Mineral Lease, dated 6/26/08; recorded 7/21/08

Lessor: Alecia Swapp Dame Trust — *Lessee:* Alton Coal Development, LLC
Surface and Mineral Lease, dated 4/29/05; recorded 5/17/06

Copies of these lease assignments are included in Appendix 1-2 located in the Volume 7, Confidential binder.

115 STATUS OF UNSUITABILITY CLAIMS

115.100 The permit area is not within an area or under study as an area designated as unsuitable for mining under R645-103-400, nor has any petitions been filed with the UDOGM under R645-103-420 that could affect the proposed permit area. The Coal Hollow Project is located on private lands adjacent to federal lands, which after careful consideration were declared suitable for mining in 1980 by then Secretary of Interior Andrus. Secretary's Decision, Petition to Designate Certain Federal Lands In Southern Utah Unsuitable for Surface Coal Mining, OSM Ref No. 79-5-001, dated December 16, 1980, copy attached at Appendix 1-3.

This petition was filed under the provisions of section 522(c) of the federal Surface Mining Control and Reclamation Act ("SMCRA"). OSM Notice, Receipt of a Complete Petition for Designation of Lands as Unsuitable for

Surface Coal Mining Operations, 45 fed. Reg. 3398, Jan. 17, 1980, attached at Appendix 1-3.

Those federal lands in the Petition area found suitable for mining include lands adjacent to the private lands which the Project has included in a federal lease by application and located in Kane County, Utah within Township 39 South, Ranges 5 and 6 West, SLM. Secretarial Decision at Paragraph 4. The Secretarial Decision was based on an extensive Administrative Record, including the Petition filed under Section 533 of SMCRA, 30 U.S.C. Section 1272, public hearings, a combined petition evaluation document and environmental impact statement published in two volumes on November 26, 1980 as, "Southern Utah Petition Evaluation Document" and the "Southern Utah Petition Evaluation Document - Comments and Responses." The Secretarial Decision was further supported by a 52 page Statement of Reasons, dated January 13, 1981, attached at Appendix 1-3.

The Secretarial Decision was upheld by the federal court in *Utah International, Inc. v. Watt*, 553 F. Supp. 872 (D. Utah 1982).

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115.300 Coal mining and reclamation activities at the Coal Hollow Project are not planned within 300 feet of an occupied dwelling or 100 feet of a public road. Drawing 1-5 shows the proximity of the Swapp Ranch to the planned operations.

116 PERMIT TERM

116.100 There are 3 mining phases associated with this permit term. The first phase of mining is anticipated to start July 1, 2008. Each mining phase has a 1 year term. Phase 3 is anticipated to conclude in year 2012.

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Acres of disturbance per Mining Phase

Phase 1	286 acres
Phase 2	109 acres
Phase 3	38 acres

116.200 Permit Term

The Coal Hollow Mine Project is proposed for a 5-year term under the Permanent Regulatory Program for 5 years

117 INSURANCE, PROOF OF PUBLICATION

Deleted: will be

Proof of publication pursuant to R645-303-322 is included in Appendix 1-5.

117.100 Certificate of Liability Insurance

Deleted: ¶

A copy of the Certificate of Liability Insurance is found in Appendix 1-4.

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Chapter 1 1/10

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118 PERMIT FILING FEE

A copy of this permit is on file with the Utah Division of Oil, Gas and Mining (UDOGM), P.O. Box 145801, Salt lake City, Utah 84114-5801. A filing fee of $5.00 accompanied permit submittal.

120 PERMIT APPLICATION FORMAT AND CONTENTS

This permit application contains information and will comply with R645-301-120. A notarized statement attesting to the accuracy of this information is set forth at Appendix 1-6.

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¶
¶

130 REPORTING OF TECHNICAL DATA

All technical data submitted in the permit application will be accompanied by the name or organization responsible for the collection and analysis of data, dates of collection and descriptions of methodology used. Technical analyses will be planned by or under the direction of a qualified professional in the subject to be analyzed.

The following assisted or were consulted in the preparation of this permit application:

State of Utah, Department of Natural Resources
Division of Oil, Gas and Mining
Salt Lake City, Utah

Department of the Interior, Bureau of Land Management
District and Regional Office
Kanab and Salt Lake City, Utah

United States Geological Survey, Utah Region
Salt Lake City, Utah

United States Department of Agriculture
Natural Resources Conservation Service
Salt Lake City, Richfield and Cedar City, Utah

State of Utah, Department of Natural Resources
Division of Wildlife Resources (DWR)
Salt Lake City, Price and Cedar City, Utah

Dr. Patrick D. Collins
Mt. Nebo Scientific Research & Consulting
Springville, UT

Erik Petersen, P.G.
Petersen Hydrologic, LLC
Lehi, UT

Dr. James E. Nelson
Brigham Young University
Provo, UT

Talon Resources, Inc
Huntington, UT

C. Burton Pugh
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Chapter 1 1/10

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Chapter 1 1/10

140 DRAWING AND PLANS

The Drawing and plans in the Mining and Reclamation Plan are submitted consistent with the requirement of R645-301-140.

150 COMPLETENESS

Alton Coal Development, LLC represents that the information contained in the Coal Hollow Mining and Reclamation Plan permit application to be complete and correct.

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Chapter 1 1/10

222.400 Present and Potential Productivity of Existing Soils

Soils in the Coal Hollow project area support big sagebrush, grasses (native and introduced species), pinyon pine, Utah juniper, and Gambel oak. Detailed descriptions of the present and potential productivity of the soils are detailed in Chapter 3, Section 321.200.

223. Soil Characterization

This soil survey was made in accordance with the guidelines for an order 2 soil survey as detailed in the Soil Survey manual (USDA 1993). Soils were classified using the Keys to Soil Taxonomy, Ninth Edition (USDA 2003). Representative soil samples were submitted for laboratory analysis of the parameters outlined by the Utah Division of Oil Gas and Mining's *Guidelines for Management of Topsoil and Overburden* (2005).

224. Substitute Topsoil

Based on the 2006-2007 order 2 soil survey, sufficient quantities of suitable topsoil and subsoil are available for reclamation within the project area. The Coal Hollow Project does not plan to use substitute material for topsoil at the time of reclamation. However, if in the future the Coal Hollow mine plan proposes to use selected overburden materials as a supplement or substitute for topsoil, an application will be provided to the DOGM that includes results of analyses, trials, and tests as described under R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. DOGM may also require the results of field-site trials or greenhouse tests as required under R645-301-233.

230. Operation Plan

231. General Requirements

231.100. Methods for Removing and Storing Subsoil and Topsoil

The methods for removing and storing topsoil, subsoil, and other materials will be to first remove the woody plants from the area and place them in piles for later placement in pit backfills. Next, dozers or scrapers will remove the topsoil layer to a depth determined by the soil survey. The topsoil will be stockpiled and protected from wind and water erosion. Stockpiles that will be in place for less than 1 year will be coated with a tackifier at the manufacturer's suggested rate for dust control applications. Those stockpiles that will be in place for at least one year will be seeded and covered with mulch during the appropriate season. Side slopes of stockpiles will be sloped to 3h:1v: The suitable subsoil will then be removed and stockpiled separately from the topsoil. The depth of topsoil and subsoil salvage will be determined by the aforementioned soil survey and in the field during mining by the Coal Hollow environmental technician in consultation with a certified professional soil scientist. Stockpiling of topsoil and subsoil will only occur when direct placement (or live hauling) is not operationally practical. Drawing 2-2 shows planned

Deleted: by seeding it with an interim seed mix.

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topsoil stockpiles and topsoil removal plans.

231.200. Suitable Substitute Topsoil

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The use of substitute topsoil is not planned based on the 2007 soil survey information. Demonstration studies of the suitability of topsoil substitutes or supplements will be submitted to the DOGM if the use of topsoil substitutes become necessary for future reclamation and revegetation.

231.300. Soil Testing for Reclamation

The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil in the same order it existed prior to removal by the mining activities. Next, a basic topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed will be:

Deleted: soil

Deleted: fertilizers and

Available phosphorus (P)
Soluble Potassium (K)
Nitrate-Nitrogen

Deleted: Electrical conductivity (EC) ¶
Sodium adsorption ratio SAR) ¶
pH¶
Texture¶
Organic matter¶

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One composite sample will be collected from approximately every 2 to 5 acres based on soil types and variability. Each composite will be comprised of at least 4 su-samples.

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Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

231.400. Topsoil Handling

The topsoil will be removed from the mine area and either live hauled to a reclamation area or stored separately. All soil stockpiles piles will be seeded with an appropriate interim seed mix to prevent loss and deterioration by wind and water erosion. Soil stockpiles will have side slopes graded to a maximum 3h:1v. Piles will be bermed or otherwise treated to prevent the transport of sediments away from the pile. Details about soil horizons and zones planned for use as subsoil are detailed in Appendix 2-1. A detailed map showing stockpile designs/locations and soil removal are shown on Drawing 2-2.

232. Topsoil and Subsoil Removal

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232.100. Separate Layers

All soil materials will be removed in separate layers from the area to be disturbed, and segregated.

Based on soil map units, average depths have been estimated and will be used as a guide and monitored in the field. Refer to Table 4-2 in Appendix

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2-1. Soil will be salvaged and directly placed or stockpiled as either topsoil or subsoil.

232.200. Topsoil of Insufficient Quantity or Quality

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Where the topsoil is of insufficient quantity or poor quality for sustaining vegetation, other materials approved by the DOGM in accordance with R645-301-233.100 will be removed as a separate layer from the area to be disturbed, and segregated.

Based on the Soil Survey, there should be sufficient quantities of topsoil to place an average of eight inches of topsoil across all reclaimed areas.

232.300. Shallow Topsoil Handling

If topsoil is less than six inches thick, the operator may remove the topsoil and the unconsolidated materials immediately below the topsoil and treat the mixture as topsoil.

Sufficient quantities of topsoil are estimated to be available for replacement of an average eight inches of topsoil across reclamation, with a minimum of six inches. Therefore, mixing of topsoil with subsoil is not anticipated to be necessary

232.400 - 232.420. Topsoil Removal Exceptions

UDOGM will not require the removal of topsoil for minor disturbances which occur at the site of small structures, such as power poles, signs, or fence lines. Removal of topsoil will not be required when the disturbances will not destroy the existing vegetation and will not cause erosion.

232.500. Subsoil Segregation

The Coal Hollow Project plans to remove soils as either topsoil or subsoil based on the completed soil survey. DOGM may require that the B horizon, C horizon, or other underlying strata, or portions thereof, be removed and segregated, stockpiled, and redistributed as subsoil in accordance with the requirements of R645-301-234 and R645-301-242 if it finds that such subsoil layers are necessary to comply with the revegetation requirements of R645-301-353 through R645-301-357.

Refer to Table 4-2 in Appendix 2-1, which contains estimated subsoil salvage depths. In addition, substitute subsoil has been identified in the layers between the identified topsoil layer and the Tropic Shale. Sufficient quantities of this material are available to live haul most of the subsoil with the exception of one stockpile that will be constructed from the initial mining area and reserved for reclamation of the final mining area. All substitute subsoil materials will be sampled and tested for pH, conductivity, SAR, percent lime, and texture, prior to salvage and stockpiling.

The following soil sampling program will be conducted during the initial mining process:

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- Topsoil: Sampling will occur every 2 to 4 acres or approximately every 2,500 to 5,000 bank cubic yards.
- Subsoil: Sampling will occur every 2 to 3 acres or approximately every 10,000 to 15,000 bank cubic yards.

These samples are anticipated to be composites of individual samples taken throughout the week during the time frames that topsoil and subsoil are being salvaged. These individual samples would be taken five days a week and composited to a single sample representing the material moved each week. The parameters that will be analyzed for topsoil are found in Table 4-1 of Appendix 2-1.

Following the initial mining process (approximately 1 year), this sampling program will be reviewed to determine the appropriate level of sampling necessary to ensure adequacy of topsoil and subsoil used in reclamation for all subsequent mining.

232.600. Timing

All material to be removed under R645-301-232 will be removed after the vegetative cover that would interfere with its salvage is cleared from the area to be disturbed, but before any drilling, blasting, mining, or other surface disturbance takes place. Drawing 2-2 shows the anticipated topsoil removal sequence and stockpiling.

232.700. Topsoil & Subsoil Removal Under Adverse Conditions

An exception to the requirements of R645-301-232 to remove topsoil or subsoils in a separate layer from an area to be disturbed by surface operations may be granted by UDOGM where the operator can demonstrate;

232.710. Unsafe Conditions

The removal of soils in a separate layer from the area by the use of conventional machines would be unsafe or impractical because of the slope or other conditions of the terrain or because of the rockiness or limited depth of the soils.

These conditions are not anticipated in the Coal Hollow project area.

232.720. Lack of On-Site Material Available

If the requirements of R645-301-233 have been or will be fulfilled with regard to the use of substitute soil materials unless no available substitute material can be made suitable for achieving the revegetation standards of R645-301-356, then the operator will, as a condition of the permit, be required to import soil material of the quality and quantity necessary to achieve such revegetation standards.

The soil survey indicates that there are sufficient quantities of topsoil and subsoil to adequately reclaim the mined area with 48 inches of combined cover. If additional

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materials are needed, then Alton Coal Development (ACD) will salvage suitable overburden for use as substitute subsoil material from the zone below the topsoil layer (8 inches thick average) to a maximum depth of 30 feet, excluding any Tropic shale materials. ACD will do additional sampling to identify the zones in which suitable materials occur for maximum salvage potential of substitute subsoil. Representative overburden samples will be analyzed for pH, conductivity, SAR, percent lime, and texture. A detailed description of subsoil sampling is provided in Section 232.500.

233.100 - 400 Topsoil Substitutes and Supplements.

Based on the Soil Survey contained in Appendix 2-1, topsoil substitutes and supplements are not anticipated to be necessary. This survey estimates that nine inches of topsoil can be replaced across the reclamation area.

234. Topsoil Storage

234.100. Stockpiles

Materials removed under R645-301-232.100, R645-301-232.200, and R645-301-232.300 will be segregated and stockpiled when it is impractical to redistribute such materials promptly on regraded areas. Drawing 2-2 shows the planned stockpile areas, anticipated storage time, quantities and size.

234.200. Requirements of Stockpiles

Stockpiled materials will be subject to the following conditions.

234.210. (a) They will be selectively placed on a stable site within the permit area. Areas are shown on Drawing 2-2.

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234.220. (b) They will be protected from contaminants and unnecessary compaction that would interfere with revegetation.

234.230. (c) They will be protected from wind and water erosion through prompt establishment and maintenance of an effective, quick growing vegetative cover or through other measures approved by the UDOGM. The side slopes will be graded to a maximum 3h:1v. Drawing 2-2 shows the planned stockpile areas, anticipated storage time, quantities and size. The interim seed mix for the stockpiles is the following:

Stockpile Interim Seed Mix		
		Rate (PLS/Acre)
Bromus carinatus	Mountain Brome	6
Elymus lanceolatus	Thickspike wheatgrass	4
Elymus amithii	Western wheatgrass	5
Elymus spicatus	Bluebunch wheatgrass	6
Poa pratensis	Kentucky bluegrass	0.4

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Total		21.40

234.240. (d) They will not be moved until required for redistribution unless approved by the UDOGM. Anticipated storage time for each stockpile is shown on Drawing 2-2.

234.300. Long-Term Disturbance & Stockpiling

When long-term disturbed areas will result from facilities and preparation plants and when stockpiling of materials removed under 8645-301-232.100 would be detrimental to the quality or quantity of those materials, DOGM may approve the temporary distribution of the soil materials removed to an approved site within the permit area to enhance the current use of that site until later when needed for reclamation, provided that the following conditions occur.

234.310. Such action will not permanently diminish the capability of the topsoil of the host site.

234.320. The material will be retained in a condition more suitable for redistribution than if stockpiled.

240. Reclamation Plan (General Requirements)

A detailed Order 2 soil survey has been completed in 2006 and 2007. This information provides detail for onsite soil suitability, salvage depths, and volumes available for reclamation of the mine site. Dozers or Scrapers will replace the subsoil and topsoil. The topsoil is estimated to average 8 inches and the subsoil will be approximately 39 inches in thickness. The total profile of topsoil and subsoil is estimated to average 48 inches.

242. Soil Redistribution

242.100. Topsoil materials removed under R645-301-232.100, R645-301-232.200, and R645-301-232.300 and stored under R645-30I-234 will be redistributed in a manner that meets the following conditions.

242.110. (a) The material achieves an approximately uniform, stable thickness consistent with the approved postmining land use, contours, and surface-water drainage systems. All slopes will be appropriately graded and leveled prior to placement of topsoil and subsoil layers. Soil layer thicknesses will be regularly checked using a high precision GPS system and spot checking by the ACD environmental technician.

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242.120. (b) Reduced material handling of the soil resource prevents excess compaction. Material handling will be minimized by direct hauling and placing materials when operationally practical rather than stockpiling.

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Materials will be spread by a dozer or scrapers and spread only as much as necessary to obtain the required uniform thickness. Traffic from rubber tired equipment across topsoil and subsoil will be minimized.

If heavy equipment operation results in excessive soil compaction at the surface of the reclaimed areas, they will then be ripped, disked, and harrowed to loosen the seedbed prior to seeding. Excessive compaction that could impact seeding success will be determined by observation and judgment of an environmental professional. In other areas where less compaction has occurred, the areas will be disked and harrowed. The disking and harrowing of all areas will be done parallel with the contour wherever possible to decrease the potential for water erosion downslope. In other areas where compaction is not a problem, dozer tracking can be used to roughen the surface, and to trap seed, fertilizer, mulch, and other amendments as well as decrease erosion by wind and water. In such cases seeding will be done immediately after this treatment, whereas soil amendments, where required, would be applied over the surface during seedbed preparations. Seeding will mainly occur in the early spring and late fall. Seeding will be accomplished by the seed drilling method followed by mulching as described in Section 244.200. Seed mixtures and rates can be viewed in Tables 3-37 through 3-42 in Chapter 3, Volume 2.

Deleted: Further details about seeding can be reviewed in Chapter 3.

242.130. (c) Handling procedures will be implemented to protect the materials from wind and water erosion before and after seeding and planting. Reclamation will be graded to the planned slope angles, not to exceed 3h:1v. Soil layers will sloped as the material is relocated to the reclaim areas. Once soil is placed, seeding will occur at the earliest appropriate season suitable to planting conditions. If the season is not appropriate for seeding at the time of topsoil placement, the topsoil will then be coated with a tackifier at the manufacturer's suggested rate for dust control applications. Mulching will be implemented on all reclamation to control erosion following seeding.

Deleted: Grass matting, mulching and/or cross ditches

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242.200. Treatments of Material to be Redistributed

Before redistribution of the materials removed under R645-301-232, the regraded land will be treated if necessary to reduce potential slippage of the redistributed material and to promote root penetration. If no harm will be caused to the redistributed material and reestablished vegetation, such treatment may be conducted after the material is replaced. Potential for slippage is anticipated to be minimal based on the planned slope angles for reclamation.

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242.300. Soil Redistribution on Impoundments & Roads

DOGM may not require the redistribution of topsoil or topsoil substitutes on the approved postmining embankments of permanent impoundments or roads if it determines the following.

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242.310. (a) Placement of topsoil or topsoil substitutes on such embankments is inconsistent with the requirement to use the best technology currently available to prevent sedimentation.

242.320. (b) Such embankments will be otherwise stabilized.

243. Soil Nutrients & Amendments

Nutrients and soil amendments will be applied to the redistributed material when necessary to establish the vegetative cover. The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil. Next, a basic topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed will be:

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Available phosphorus (P)
Soluble Potassium (K)
Nitrate-Nitrogen

Deleted: Electrical conductivity (EC)¶
Sodium adsorption ratio (SAR)¶
pH¶
Texture¶
Organic matter¶

One composite sample will be collected from approximately every 2 to 5 acres based on soil types and variability. Each composite will be comprised of at least 4 su-samples.

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Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

244. Soil Stabilization

244.100. Erosion Protection from Wind & Water

All exposed surface areas will be protected and stabilized to effectively control erosion and air pollution attendant to erosion. Reclamation will be regraded to the planned slope angles, not to exceed 3h:1v. Soil layers will be sloped as the material is relocated to the reclaim areas. Once soil is placed, seeding will occur at the earliest appropriate season suitable to planting conditions. Grass matting, mulching and/or cross ditches will be implemented as necessary to control erosion. Temporary stockpiles that will be in place for more than 1 year will be seeded with the temporary seed mix provided in Section 234.230 and mulched by one of the methods described in Section 244.200. Temporary stockpiles that will be in place for less than one year will be coated with a tackifier at the manufacturer's suggested rate for dust control applications.

244.200. Mulch

Suitable mulch and other soil stabilizing practices will be used on all areas that

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have been regraded and covered by topsoil or topsoil substitutes. DOGM may waive this requirement if seasonal, soil, or slope factors result in a condition where mulch and other soil stabilizing practices are not necessary to control erosion and to promptly establish an effective vegetative cover.

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished. Mulching will occur by one of the following methods:

- Certified noxious weed free straw applied at a rate of 1 ton/acre anchored by crimping or a chemical binder.
- Wood fiber hydromulch at a rate of ¾ ton per acre for slopes flatter than 3:1 and 1 ton per acre for slopes at 3:1 which is the steepest slope planned at the project. This hydromulch would be anchored with a chemical binder at the manufacturer's suggested rate.

Deleted: in areas that will be reclaimed to native plant communities (areas used for pasture lands will not be mulched).

The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Since there is only one post mining land use, mulching will follow one of the above described methods for all reclaim areas.

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244.300. Rills & Gullies

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Rills and gullies that form in areas that have been regraded and topsoiled that cause the following conditions will have the topsoil replaced followed by reseeding or replanting if the following occurs.

244.310. (a) If they disrupt the approved postmining land use or the reestablishment of the vegetative cover.

244.320. (b) If they cause or contribute to a violation of water quality standards for receiving streams will be filled, regraded, or otherwise stabilized; topsoil will be replaced; and the areas will be reseeded or planted.

250. PERFORMANCE STANDARDS

251.Topsoil & Subsoil Removed

All topsoil, subsoil and topsoil substitutes or supplements will be removed, maintained and redistributed according to the plan given under R645-301-230 and R645-301-240.

252.Topsoil & Subsoil Stockpiled

All stockpiled topsoil, subsoil and topsoil substitutes or supplements will be located, maintained and redistributed according to plans given under R645-301-230 and R645-301-240.

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WordPerfect Document Compare Summary

Original document: Z:\WPWIN\CLIENTS\Alton08.Jan.MRP.Biology.wpd
Revised document:
@PFDesktop\:MyComputer\Z:\WPWIN\CLIENTS\Alton08.Dec.MRP.Biology.wpd
Deletions are shown with the following attributes and color:
~~Strikeout~~, Red RGB(255,0,0).
Deleted text is shown as full text.
Insertions are shown with the following attributes and color:
Double Underline, Blue RGB(0,0,255).

The document was marked with 64 Deletions, 112 Insertions, 0 Moves.

R645-301-300. BIOLOGY

310. INTRODUCTION

The following section has been created to be submitted to the State of Utah, Division of Oil, Gas & Mining (DOGM). It describes specific biological resources of the Coal Hollow Project near the town of Alton, Utah. Updates to the data sets herein will be a continuous undertaking. This chapter contains information including the following:

311. Vegetative, fish, and wildlife resources of the permit area and adjacent areas as described under R645-301-320.

312. Potential impacts to vegetative, fish and wildlife resources and methods proposed to minimize these impacts during coal mining and reclamation operations as described under R645-301-330 and R645-301-340.

313. Proposed reclamation designed to restore or enhance vegetative, fish, and wildlife resources to a condition suitable for the designated postmining land use as described under R645-301-340.

320. ENVIRONMENTAL DESCRIPTION

321. VEGETATION INFORMATION

321.100. Vegetation Mapping and Plant Community Data in the Permit Area

The first vegetation map prepared for the Coal Hollow Project delineated the plant communities that existed within the permit area. The plant communities for the permit area on this early map were drafted on a USGS quadrangle map using information from an existing vegetation map that was prepared from previous work in the area. The earlier work was accomplished in the late-1980s.

A new flight was conducted for the Coal Hollow Project in 2006 that provided aerial photography and more detailed information than had previously been available. This aerial photography and photogrammetric mapping has been used in preparation of many updated maps of the project area, including a revised vegetation map where the plant communities were delineated on the new aerial photographs. Also, new quantitative data were recorded in 2006 in some of the first plant communities proposed for disturbance along with reference areas that would *not* be disturbed. This next version of the vegetation map for the Coal Hollow project also provided sample locations of these recently studied areas. This map was submitted to DOGM in the last MRP submittal (*dated May 25, 2007*) along with the first vegetation quadrangle map, because it continued to provide support for some of the older vegetation data also submitted in the MRP at that time.

Like the earlier vegetation mapping information, and because the area has been studied previously, existing quantitative data sets were also available for the plant communities of the Coal Hollow Project area. These data were recorded in the late-1980s. The aforementioned earlier quadrangle vegetation map corresponded to this early vegetation information. The early datasets were included in the MRP provided to DOGM (*submittal date: May 25, 2007*). Although this information was valuable at that time because it provided initial baseline data for that time period, plans to re-sample the same plant communities to update the existing data were made. Consequently, new quantitative sampling was accomplished later in 2007 to provide updated information about the plant communities within the permit area. The updated data have been summarized and included in this MRP. Therefore, with the 2006 and 2007 quantitative data for the plant communities submitted in the MRP, the dataset for those plant communities proposed for disturbance in the current mine plan for the entire permit area is complete. **Therefore, the older vegetation datasets and maps created using information from the late-1980s were replaced by the updated datasets and maps in the MRP**.

Reference areas chosen to represent future revegetation success standards were also chosen and sampled during the same sample periods in 2006 and 2007 as those proposed for disturbance by the mining operations.

Acreage of each plant community and map symbols shown on the revised Vegetation Map *(Drawing 3-1, dated 12/26/07)* for the Coal Hollow Project permit and adjacent areas are shown below.

Vegetation Communities of the Coal Hollow Permit Area			
MAP SYMBOL (see *Vegetation Map*, Drawing 3-1)	PLANT COMMUNITY	TOTAL ACREAGE	PERCENT OF TOTAL
S/G	Sagebrush/Grass	212.00	33.64
P	Pasture Land	192.00	30.48
P-J	Pinyon-Juniper	114.00	18.10
M	Meadow	69.00	10.95
OB	Oak Brush	40.00	6.35
RB/SB	Rabbitbrush/Sagebrush (Disturbed; previously Sagebrush/Grass)	3.00	0.48
	Total*	**630.00**	100.00

Color photographs of the plant communities within the Coal Hollow Project permit area are shown in **PHOTOGRAPHS** section near the end of this chapter.

The above plant communities exist within the boundaries of the Coal Hollow Project permit area and will be disturbed by the coal mining and related activities. Consequently, quantitative and qualitative data were recorded by sampling the plant communities in 2006 and 2007. For general, wide-angle views of the plant communities in the permit area, refer to Photographs 3-1, 3-2, 3-3 and 3-4.

[**NOTE**: The rabbitbrush/sagebrush community was not sampled for baseline data information. This small area represented less that one-half of one percent of the permit area. Moreover, it was a *previously disturbed* sagebrush/grass community. Therefore, standards of revegetation success at final reclamation will be the same as those outlined for the *undisturbed* sagebrush/grass plant communities described in this document].

As mentioned other areas with similar plant communities were sampled within or near the permit area that will *not* be disturbed by mine-related activities. These native plant communities were chosen to be used as future revegetation success standards at the time of final reclamation of the mine site. Therefore, the same methods and parameters were employed in the reference areas that were used to sample the areas proposed for disturbance. The areas with like-communities sampled (the proposed disturbed area and reference area) for each community type, were compared statistically for their appropriateness as reference areas at this time. Similar comparisons (and additional comparisons) will also be conducted between the communities once the land is reclaimed. Complete results and methodologies used are shown in the final reports prepared from sampling these communities. These reports have been included in the appendices at the end of this chapter. The reports titles are: *Vegetation of the Sagebrush/Grass & Meadow Areas: 2006* (**Appendix 3-2**) and *Vegetation Sampling in the Coal Hollow Project Area: 2007* (**Appendix 3-4**). Following is a summary of the results from sampling these communities.

Proposed Disturbed Sagebrush/Grass Community

One of the most common plant communities of the Coal Hollow permit area was sagebrush/grass (see *Vegetation Map, Drawing 3-1* and Photograph 3-5).

Sagebrush community types in the permit area can be dominated by either big sagebrush (*Artemisia tridentata*) or black sagebrush (*A. nova*). In the sagebrush/grass community that has been proposed for disturbance and sampled, both of these species were nearly equally represented. The dominant plant species as shown in the species cover table (Table 3-1) were big sagebrush, black sagebrush, jungrass (*Koeleria macrantha*), and Sandberg's bluegrass (*Poa secunda*).

The total living cover of this sagebrush/grass community was estimated at 54.73%, of which 52.40% of it was from understory cover and only 2.33% was from overstory [Table 3-2 (A)]. Shrubs dominated the composition here representing 64.09% of the total living understory cover, followed by grasses at 34.64%, and forbs at 1.28% [Table 3-2 (B)]. Woody species density was also measured; the total number of individuals per acre was estimated at 8,339 (Table 3-3).

Sagebrush/Grass Reference Area

The sagebrush/grass community chosen as a reference area to be used for future revegetation success standards was located northwest of the sagebrush/grass community that was proposed for disturbance, and just outside the permit area (see *Vegetation Map, Drawing 3-1* and Photograph 3-6).

This plant community will remain undisturbed and is similar to the proposed disturbed area. It had been chosen to be used for future revegetation success standards and had similar cover, composition, and woody species density. Cover and frequency by species of the sagebrush/grass reference area are shown on Table 3-4. The dominant shrub plant species here were big sagebrush and black sagebrush. The most common grass species were slender wheatgrass (*Elymus trachycaulus*), cheatgrass *(Bromus tectorum*), Kentucky bluegrass, and Sandberg's bluegrass.

The total living cover in the area was estimated at 60.50%, all of which was from understory cover [Table 3-5(A)]. Woody species dominated the composition at 61.48%, whereas grasses comprised 29.86%, and forbs 8.65% [Table 3-5(B)].

The total number of plants per acre in the woody species density measurements was 8,331 (Table 3-6). Big sagebrush and black sagebrush dominated the woody species in the density measurements.

Proposed Disturbed Meadow (Dry) Community

There are different meadow lands located within the permit area. These meadows have somewhat been differentiated on the *Vegetation Map (Drawing: 3-1)* which show them as "M (Dry)" compared to those that retain more soil moisture, or shown as merely as "M" on the map. The year 1 mining operations would disturb a dry meadow community on the west side of the permit area (see Photograph 3-7).

Quantitative sampling was conducted in this meadow. As shown on Table 3-7, the dominant species in the proposed disturbed meadow were grass and grass-like species including sedge (*Carex* sp.), wiregrass (*Juncus arcticus*) and junegrass. Broom snakeweed (*Gutierrezia sarothrae*) was the dominant shrub, whereas the dominant forbs were yarrow (*Achillea millefolium*) and Pacific aster (*Aster ascendens*).

The total living cover was estimated at 73.00% [Table 3-8 (A)]. The composition of the understory was 75.70% grasses (and grass-likes), 13.28% forbs, and 11.01% shrubs [Table 3-8 (B)]. The total number of plants per acre in the woody species density measurements was 817 (Table 3-9). Black sagebrush was the only woody species present in the density measurements.

Meadow (Dry) Reference Area

The dry meadow reference area was chosen outside the permit area, but in close proximity to the dry meadow proposed to be disturbed by the mine (see *Vegetation Map, Drawing 3-1* and Photograph 3-8). The dominate grass and grass-like species in the dry meadow reference area were wiregrass, sedge, and junegrass (Table 3-10). The dominant forbs were yarrow, Pacific aster, and cinquefoil (*Potentilla anserina*). The only shrubs present in the sample quadrats were black sagebrush and broom snakeweed.

The total living cover of this reference area was 72.00% [Table 3-11(A)]. The understory cover composition was comprised of 71.05% grasses (and grass-likes), 22.31% forbs and 6.64% shrubs [Table 3-11 (B)]. The total woody species density of the community was 1,481 plants per acre and was comprised exclusively of black sagebrush (Table 3-12).

Proposed Disturbed Pinyon-Juniper Community

Several areas proposed for disturbance by mining activities currently support pinyon-juniper plant communities. For a representative picture of these sample areas see Photograph 3-9. Pinyon-juniper communities were sampled in two areas. One such area, shown as the "Prop. Dist. Pinyon-Juniper Sample Area (North)" on the *Vegetation Map, Drawing 3-1*, is located on the east side of the permit area and *north* of another pinyon-juniper sample area. This is a site where mining activities have been planned during the first year of mining activities. Another pinyon-juniper sample area or the "Prop. Dist. Pinyon-Juniper Sample Area (South)" on the map, is located near the south boundary of the permit area and also *south* of the other pinyon-juniper sample area. Disturbance from mining-related activities of the south sample area have been planned during the third year of mining. These two datasets have been combined to show the final results of the sample data for the proposed disturbed pinyon-juniper community as a whole, but the data could easily be separated at a later time if for some reason it is desired.

Overstory cover of the pinyon-juniper community was represented by only two species in the sample quadrats, but was dominated by Utah juniper (*Juniperus osteosperma*) and followed distantly by pinyon pine (*Pinus edulis*). Understory cover was dominated by black sagebrush, followed by Utah juniper and pinyon pine (Table 3-13). Grasses were few and forbs were absent in the sample quadrats.

The total living cover of the pinyon-juniper community was 43.00%, of which 25.00% was from understory and 18.00% was from overstory species [Table 3-14 (A)]. The understory composition by lifeform in this community was comprised of 95.88 % woody species [Table 3-14 (B)]. Woody species density was measured at 2,657 individuals per acre (Table 3-15).

Pinyon-Juniper Reference Area

A reference area, or an area chosen to represent future revegetation success standards, was chosen and sampled in another pinyon-juniper plant community (see Photograph 3-10). This reference area will *not* be disturbed by the mining operations so it could be used for data comparisons following final reclamation at the mine site. The pinyon-juniper reference area was located near the *north* proposed disturbed pinyon-juniper community (see *Vegetation Map, Drawing 3-1*).

Like the above proposed disturbed community, the overstory cover of the reference area was dominated by Utah juniper followed by pinyon pine. Understory was also dominated by black sagebrush, Utah juniper and pinyon pine (Table 3-16). Again forbs were not present in the quadrats; grasses present were slender wheatgrass and squirreltail (*Elymus elymoides*).

The total living cover of the pinyon-juniper reference area was estimated at 39.00%, 11.50% of it was composed of overstory and 27.50% was understory cover [Table 3-17 (A)]. The composition of the understory in the pinyon-juniper reference area was calculated as 89.56% trees and shrubs and 10.44% grasses [Table 3-17 (B)]. Woody species density was dominated by black sagebrush and Utah juniper, but the total of all species was 4,215 individuals per acre (Table 3-18).

Proposed Disturbed Pasture Land Community

The areas called "pasture lands" in the text and maps of this document were plant communities that have been disturbed previously to artificially increase herbaceous cover and productivity for domestic livestock. Prior to pasture lands, these communities were probably native sagebrush/grass plant communities similar to those sampled and described in the 2006 report (*Vegetation of the Sagebrush/Grass & Meadow Areas: 2006*). Although differences occur between pastures due to grazing practices and species planted, representative pastures were sampled for this report (see Photographs 3-11 and 3-12). The sample areas were located near the center of the permit area (see *Vegetation Map, Drawing 3-1*). Again, different locations within this community were sampled, a *north* and a *south* area; and the data were combined for the summary tables in this report. The proposed disturbed pasture land (*north*) was an area proposed for disturbance by operations during the first year of mining activities. The proposed disturbed pasture land (*south*) was an area proposed for disturbance by operations in the second year of mining activities.

The sampling results for the north and south pasture lands indicate that the most common plant species by cover and frequency for the combined data were intermediate wheatgrass (*Elymus hispidus*), Kentucky bluegrass (*Poa pratensis*), black sagebrush (Table 3-19). The annual plant called poverty weed (*Iva axillaris*) was also common in the sample areas.

The total living cover, all of it from understory species, was 44.50% [Table 3-20 (A)]. The composition of the pasture lands consisted of 52.16% grasses, 30.19% shrubs and 17.64% forbs [Table 3-20 (B)]. Woody species density measurements show the woody species density to be 1,349 individuals per acre with the most common species being big sagebrush *(Artemisia tridentata*), rubber rabbitbrush (*Chrysothamnus nauseosus*) and black sagebrush (Table 3-21).

Pasture Land Reference Area

Because the pasture lands were unnatural or comprised of non-native conditions, a native reference area to represent future revegetation success standards was not chosen. Appropriate standards of revegetation success will be developed using the site-specific knowledge gained by the landowners, regulatory agencies, as well as qualified botanists and wildlife biologists representing the coal company.

Proposed Disturbed Oak Brush Community

An oak brush community has been proposed for disturbance by future mining operations (see Photograph 3-13). This community was located in the northeast region of the permit area (*see Vegetation Map, Drawing 3-1*).

Overstory of this community was greater than the understory cover. The dominant overstory species by a wide margin was Gambel's oak (*Quercus gambelii*) with a 41.25% cover and was present in 85.00% of the samples. The dominant understory species were big sagebrush, snowberry (*Symphoricarpos oreophilus*) and Gambel's oak (Table 3-22).

The total living cover in the proposed disturbed oak brush community was estimated at 66.75%, 43.00% coming from overstory and 23.75% from understory plants [Table 3-23 (A)]. Woody species comprised 97.75% of the understory composition with the remaining 2.25% coming from grass species [Table 3-23 (B)]. Forbs were not present in the sample quadrats. Woody species density was estimated at 3,743 plants per acre and, like the cover results, the most common species consisted of snowberry, Gambel's oak and big sagebrush (Table 3-24).

Oak Brush Reference Area

A oak brush reference area was chosen to represent future success standards for revegetation (see Photograph 3-14). This reference area was located on the east side of the permit area *(see Vegetation Map, Drawing 3-1*). Like the proposed disturbed area it was chosen to represent, the reference area's cover was greater for overstory than that of the understory. The dominant overstory species by far was Gambel's oak. Dominant understory species were Gambel's oak, Kentucky bluegrass, Utah juniper, big sagebrush and snowberry (Table 3-25).

Overstory cover was estimated at 53.25%, whereas understory cover was 20.00%. The total living cover of those combined was 73.25% [Table 3-26 (A)]. Understory lifeform composition was comprised of 66.92% trees and shrubs and 33.08% grasses – no forbs were present [Table 3-26 (B)]. Woody species density was estimated at 2,092 plants per acre with the most common by a wide margin being Gambel's oak, but also consisted of snowberry, big sagebrush, Rocky Mountain juniper (*Juniperus scopulorum*), pinyon pine and Utah juniper (Table 3-27).

Proposed Disturbed Meadow Community

Meadow areas in and adjacent to the project permit area have been studied (see *Vegetation Map, Drawing 3-1*). A dry meadow was mentioned above and reported in the 2006 document included in the MPR [*Vegetation of the Sagebrush/Grass & Meadow Areas: 2006* (**Appendix 3-2**)]. However, another meadow community that retains more soil moisture has also been proposed for disturbance due to the mining (see Photograph 3-15). The complete report for this study has been include in the appendix section of Chapter 3 [*Vegetation Sampling in the Coal Hollow Project Area: 2007* (**Appendix 3-4**)].

The dominant plant species by cover and frequency in this community were wiregrass, Missouri iris (*Iris missouriensis*) and Wood's rose (*Rosa woodsii*). For a list of all species present in the sample quadrats refer to Table 3-28. This meadow community had a total living cover of 86.00% [Table 3-29 (A)]. Of this living cover 51.58% of it were comprised grasses or grass-like species, 32.54% were forbs and 15.88% were shrubs [Table 3-29 (B)]. Woody species density of the community was 384 individuals per acre, all of which was Wood's rose (Table 3-30).

Meadow Reference Area

The reference area, or area chosen to represent future revegetation success standards, was located just outside the permit area (*Vegetation Map, Drawing 3-1;* Photograph 3-16). Similar species dominated this community as were represented in the proposed disturbed area, namely wiregrass, Missouri iris, Kentucky bluegrass (*Poa pratensis*) and Wood's rose (Table 3-31). The total living cover in the reference area was estimated at 88.50% [Table 3-32 (A)]. Composition here was calculated to be comprised of 51.57% grass and grasslike species, 37.38% forbs and 11.04% shrubs [Table 3-32 (B)]. Woody species density in this area was estimated at 2,226 plants per acre (Table 3-33).

Other Meadow Communities

Other meadow communities were studies outside the permit area (see *Vegetation Map, Drawing 3-1*). These areas will not be disturbed by mining activities – they were studied to provide more information about the meadows in the area to provide companion studies for other studies such as alluvial valley floor determinations. Results from these studies can be found in the Chapter 3 appendices [*Vegetation Sampling in the Coal Hollow Project Area: 2007* (**Appendix 3-4)**].

Table 3-1: Alton Coal Project. Living Cover and Frequency by Plant Species (2006).

Sagebrush/Grass (S/G) Proposed Disturbed			
	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY COVER			
Juniperus osteosperma	2.33	9.55	6.67
UNDERSTORY COVER			
TREES & SHRUBS			
Artemisia nova	14.93	17.10	50.00
Artemisia tridentata var. tridentata	15.23	20.48	26.67
Chrysothamnus depressus	2.07	5.90	16.67
Gutierrezia sarothrae	1.23	2.79	20.00
FORBS			
Eriogonum racemosa	0.33	1.25	6.67
Gilia aggregata	0.33	1.25	6.67
Linum perenne	0.10	0.54	3.33
GRASSES			
Bouteloua gracilis	2.33	8.54	10.00
Bromus tectorum	0.83	3.18	6.67
Elymus smithii	0.50	1.98	6.67
Elymus trachycaulus	0.50	1.98	6.67
Hordeum jubatum	0.83	1.86	16.67
Koeleria macrantha	4.17	10.25	23.33
Poa pratensis	3.17	7.69	16.67
Poa secunda	4.00	7.00	30.00
Stipa hymenoides	1.83	3.53	23.33

Table 3-2: Coal Hollow Project. Total Cover and Composition (2006)		
Sagebrush/Grass (S/G) Proposed Disturbed		
A. TOTAL COVER	Mean Percent	Standard Deviation
Overstory Cover (o)	2.33	9.55
Understory Cover (u)	52.40	13.67
Litter	16.17	10.90
Bareground	26.87	11.83
Rock	4.57	6.15
TOTAL LIVING (o + u)	54.73	13.52
B. % COMPOSITION (u)		
Shrubs	64.09	22.93
Forbs	1.28	3.55
Grasses	34.64	22.43

Table 3-3: Coal Hollow Project. Woody Species Density (2006).

Sagebrush/Grass (S/G) Proposed Disturbed	
SPECIES	**Individuals Per Acre**
Artemisia tridentata	2779.73
Artemisia nova	4100.11
Chrysothamnus depressus	833.92
Chrysothamnus nauseosus	69.49
Chrysothamnus viscidiflorus	138.99
Gutierrezia sarothrae	277.96
Juniperus osteosperma	138.99
TOTAL	**8339.20**

Table 3-4: Alton Coal Project. Living Cover and Frequency by Plant Species (2006).

Sagebrush/Grass (S/G) Reference Area	Mean Percent	Standard Deviation	Percent Frequency
TREES & SHRUBS			
Artemisia nova	23.85	18.18	75.00
Artemisia tridentata	10.90	13.39	55.00
Chrysothamnus nauseosus	2.10	3.78	25.00
Gutierrezia sarothrae	0.90	2.72	10.00
Juniperus osteosperma	0.25	1.09	5.00
FORBS			
Achillea millefolium	0.25	1.09	5.00
Aster ascendens	3.00	4.58	35.00
Erigeron religiosus	0.25	1.09	5.00
Iva axillaris	1.00	2.00	20.00
Sphraelcea coccinea	0.25	1.09	5.00
GRASSES			
Bromus tectorum	4.75	6.61	45.00
Elymus smithii	0.50	2.18	5.00
Elymus trachycaulus	5.25	9.93	30.00
Juncus arcticus	0.75	3.27	5.00
Poa pratensis	3.00	7.65	15.00
Poa secunda	2.75	5.36	25.00
Stipa hymenoides	0.75	2.38	10.00

Table 3-5: Coal Hollow Project. Total Cover and Composition (2006).		
Sagebrush/Grass (S/G) Reference Area		
A. TOTAL COVER	Mean Percent	Standard Deviation
Understory Cover (u)	60.50	13.03
Litter	13.05	4.81
Bareground	25.05	13.58
Rock	1.40	1.20
B. % COMPOSITION (u)		
Trees/Shrubs	61.48	17.01
Forbs	8.65	8.73
Grasses	29.86	14.18

Table 3-6: Coal Hollow Project. Woody Species Density (2006).

Sagebrush/Grass (S/G) Reference Area	
SPECIES	**Individuals Per Acre**
Artemisia tridentata	3644.87
Artemisia nova	3957.29
Chrysothamnus nauseosus	624.83
Gutierrezia sarothrae	208.28
TOTAL	**8331.13**

Table 3-7: Alton Coal Project. Living Cover and Frequency by Plant Species (2006).

Meadow (M) Dry Proposed Disturbed	Mean Percent	Standard Deviation	Percent Frequency
TREES & SHRUBS			
Artemisia nova	1.00	2.00	20.00
Gutierrezia sarothrae	7.20	4.80	85.00
FORBS			
Achillea millefolium	6.40	6.42	55.00
Aster ascendens	2.00	4.00	25.00
Eriogonum racemosa	0.25	1.09	5.00
Linum lewisii	1.00	3.39	10.00
Potentilla anserina	0.25	1.09	5.00
GRASSES			
Bouteloua gracilis	2.25	6.80	10.00
Carex sp.	27.50	19.46	75.00
Elymus elymoides	0.50	1.50	10.00
Elymus smithii	0.75	2.38	10.00
Hordeum jubatum	0.50	2.18	5.00
Juncus arcticus	10.25	13.27	70.00
Koeleria macrantha	8.00	10.17	55.00
Muhlenbergia asperifolia	0.50	2.18	5.00
Poa pratensis	4.65	10.62	25.00

Table 3-8: Coal Hollow Project. Total Cover and Composition (2006).

Meadow (M) Dry Proposed Disturbed		
A. TOTAL COVER	Mean Percent	Standard Deviation
Understory Cover (u)	73.00	9.67
Litter	9.40	3.28
Bareground	16.50	9.67
Rock	1.10	0.30
B. % COMPOSITION (u)		
Shrubs	11.01	8.10
Forbs	13.28	8.74
Grasses	75.70	13.81

Table 3-9: Coal Hollow Project. Woody Species Density (2006).

Meadow (M) Dry (Proposed Disturbed)	
SPECIES	**Individuals Per Acre**
Artemisia nova	816.75
TOTAL	**816.75**

Table 3-10: Alton Coal Project. Living Cover and Frequency by Plant Species (2006).

Meadow (M) Dry Reference Area	Mean Percent	Standard Deviation	Percent Frequency
TREES & SHRUBS			
Artemisia nova	3.25	6.76	25.00
Gutierrezia sarothrae	1.50	3.91	15.00
FORBS			
Achillea millefolium	5.50	5.45	60.00
Artemisia campestris	1.25	3.83	10.00
Aster ascendens	5.00	6.12	50.00
Eriogonum racemosa	0.25	1.09	5.00
Linum lewsii	0.25	1.09	5.00
Potentilla anserina	3.25	7.12	20.00
GRASSES			
Bouteloua gracilis	1.75	5.76	10.00
Carex sp.	16.50	12.05	80.00
Elymus elymoides	0.75	3.27	5.00
Elymus smithii	0.50	2.18	5.00
Elymus spicatus	1.50	6.54	5.00
Elymus trachycaulus	4.00	9.82	15.00
Juncus arcticus	15.25	16.84	70.00
Koeleria macrantha	9.50	11.06	45.00
Muhlenbergia asperifolia	0.25	1.09	5.00
Poa pratensis	1.75	4.26	15.00

Table 3-11: Coal Hollow Project. Total Cover and Composition (2006).		
Meadow (M) Dry Reference Area		
A. TOTAL COVER	Mean Percent	Standard Deviation
Understory Cover (u)	72.00	8.86
Litter	11.70	5.16
Bareground	14.70	6.65
Rock	1.60	2.18
B. % COMPOSITION (u)		
Shrubs	6.64	10.29
Forbs	22.31	12.24
Grasses	71.05	12.91

Table 3-12: Coal Hollow Project. Woody Species Density (2006).

Meadow (M) Dry Reference Area	
SPECIES	**Individuals Per Acre**
Artemisia nova	1481.04
TOTAL	**1481.04**

Table 3-13: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Pinyon-Juniper (P-J) Proposed Disturbed	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Juniperus osteosperma	16.75	18.66	55.00
Pinus edulis	1.25	5.45	5.00
UNDERSTORY			
SHRUBS			
Artemisia nova	17.50	14.87	70.00
Juniperus osteosperma	5.75	8.98	35.00
Pinus edulis	0.50	2.18	5.00
FORBS			
GRASSES			
Elymus elymoides	0.75	3.27	5.00
Elymus trachycaulus	0.50	1.50	10.00

Table 3-14: Coal Hollow Project. Total Cover and Composition (2007)		
Pinyon-Juniper (P-J) Proposed Disturbed		
A. TOTAL COVER	Mean Percent	Standard Deviation
OVERSTORY (o)	18.00	18.33
UNDERSTORY (u)	25.00	11.40
Litter	22.55	19.66
Bareground	48.40	17.18
Rock	4.05	2.27
TOTAL LIVING (o + u)	43.00	15.20
B. % COMPOSITION (u)		
Trees & Shrubs	95.88	13.26
Forbs	0.00	0.00
Grasses	4.13	13.26

Table 3-15: Coal Hollow Project. Woody Species Density (2007).

Pinyon-Juniper (P-J) Proposed Disturbed	
SPECIES	**Individuals Per Acre**
Artemisia tridentata	166.03
Artemisia nova	1627.12
Juniperus osteosperma	730.55
Pinus edulis	132.83
TOTAL	2656.53

Table 3-16: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Pinyon-Juniper (P-J) Reference Area	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Juniperus osteosperma	9.00	13.56	40.00
Pinus edulis	2.50	10.90	5.00
UNDERSTORY			
SHRUBS			
Artemisia nova	17.75	12.70	80.00
Juniperus osteosperma	3.75	6.68	30.00
Pinus edulis	2.25	5.58	15.00
FORBS			
GRASSES			
Elymus elymoides	2.00	4.00	20.00
Elymus trachycaulus	1.75	4.26	15.00

Table 3-17: Coal Hollow Project. Total Cover and Composition (2007)		
Pinyon-Juniper (P-J) Reference Area		
A. TOTAL COVER	Mean Percent	Standard Deviation
OVERSTORY (o)	11.50	16.05
UNDERSTORY (u)	27.50	11.35
Litter	19.00	14.20
Bareground	46.50	19.69
Rock	7.00	2.45
TOTAL LIVING (o + u)	39.00	11.36
B. % COMPOSITION (u)		
Trees & Shrubs	89.56	14.77
Forbs	0.00	0.00
Grasses	10.44	14.77

Table 3-18: Coal Hollow Project. Woody Species Density (2007).

Pinyon-Juniper (P-J)
Reference Area

SPECIES	Individuals Per Acre
Artemisia tridentata	158.05
Artemisia nova	3213.71
Juniperus osteosperma	632.20
Pinus edulis	210.73
TOTAL	4214.70

Table 3-19: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Pasture Land (P) Proposed Disturbed	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia tridentata	3.67	9.74	20.00
Artemisia nova	5.67	9.37	33.33
Chrysothamnus nauseosus	3.17	6.77	20.00
Rosa woodsii	0.50	1.50	10.00
FORBS			
Achillea millefolium	1.00	3.27	10.00
Aster sp.	0.83	2.61	10.00
Iris missouriensis	0.83	3.67	6.67
Iva axillaris	4.50	8.69	26.67
GRASSES (and grass-likes)			
Agropyron cristatum	3.83	6.28	30.00
Bromus inermis	1.50	7.21	6.67
Bromus tectorum	2.83	6.67	16.67
Elymus hispidus	6.50	12.12	30.00
Elymus smithii	3.00	8.23	20.00
Elymus trachycaulus	0.33	1.80	3.33
Juncus arcticus	0.50	1.98	6.67
Poa pratensis	5.83	13.85	16.67

Table 3-20: Coal Hollow Project. Total Cover and Composition (2007)		
Pasture Land (P) **Proposed Disturbed**		
A. TOTAL COVER	Mean Percent	Standard Deviation
Understory Cover (u)	44.50	10.59
Litter	24.10	11.67
Bareground	29.63	10.53
Rock	1.77	1.48
B. % COMPOSITION (u)		
Shrubs	30.19	26.65
Forbs	17.64	22.73
Grasses	52.16	25.41

Table 3-21: Coal Hollow Project. Woody Species Density (2007).

Pasture Land (P) **Proposed Disturbed**	
SPECIES	**Individuals Per Acre**
Artemisia tridentata	618.30
Artemisia nova	348.50
Chrysothamnus nauseosus	303.53
Gutierrezia sarothrae	22.48
Rosa woodsii	56.21
TOTAL	**1349.02**

Table 3-22: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Oak Brush (OB) Proposed Disturbed	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Juniperus scopulorum	1.75	7.63	5.00
Quercus gambelii	41.25	24.33	85.00
UNDERSTORY			
SHRUBS			
Artemisia tridentata	11.10	15.91	45.00
Juniperus osteosperma	0.50	2.18	5.00
Juniperus scopulorum	2.75	7.33	15.00
Quercus gambelii	3.40	4.91	35.00
Symphoricarpos oreophilus	5.50	9.99	35.00
FORBS			
GRASSES			
Bromus carinatus	0.25	1.09	5.00
Poa pratensis	0.25	1.09	5.00

Table 3-23: Coal Hollow Project. Total Cover and Composition (2007)		
Oak Brush (OB) **Proposed Disturbed**		
A. TOTAL COVER	Mean Percent	Standard Deviation
OVERSTORY (o)	43.00	22.49
UNDERSTORY (u)	23.75	12.23
Litter	61.25	15.24
Bareground	13.25	9.51
Rock	1.75	1.41
TOTAL LIVING (o + u)	66.75	14.86
B. % COMPOSITION (u)		
Trees & Shrubs	97.75	6.80
Forbs	0.00	0.00
Grasses	2.25	6.80

Table 3-24: Coal Hollow Project. Woody Species Density (2007).

Oak Brush (OB) Proposed Disturbed	
SPECIES	**Individuals Per Acre**
Artemisia tridentata	888.89
Symphoricarpos oreophilus	1169.59
Gutierrezia sarothrae	46.78
Juniperus osteosperma	233.92
Juniperus scopulorum	374.27
Quercus gambelii	1029.24
TOTAL	**3742.70**

Table 3-25: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Oak Brush (OB) Reference Area	Mean Percent	Standard Deviation	Percent Frequency
OVERSTORY			
SHRUBS			
Juniperus osteosperma	3.75	11.28	10.00
Juniperus scopulorum	1.75	7.63	5.00
Quercus gambelii	47.75	23.21	85.00
UNDERSTORY			
SHRUBS			
Artemisia tridentata	2.40	6.32	15.00
Juniperus osteosperma	3.00	9.14	10.00
Juniperus scopulorum	1.75	7.63	5.00
Pinus edulis	0.50	2.18	5.00
Quercus gambelii	5.85	8.56	40.00
Symphoricarpos oreophilus	1.75	3.96	20.00
FORBS			
GRASSES			
Poa pratensis	0.75	2.38	10.00
Poa secunda	4.00	7.00	30.00

Table 3-26: Coal Hollow Project. Total Cover and Composition (2007)		
Oak Brush (OB) Reference Area		
A. TOTAL COVER	Mean Percent	Standard Deviation
OVERSTORY (o)	53.25	13.63
UNDERSTORY (u)	20.00	8.37
Litter	66.70	21.24
Bareground	8.30	13.49
Rock	5.00	16.07
TOTAL LIVING (o + u)	73.25	12.68
B. % COMPOSITION (u)		
Trees & Shrubs	66.92	43.92
Forbs	0.00	0.00
Grasses	33.08	43.92

Table 3-27: Coal Hollow Project. Woody Species Density (2007).

Oak Brush (OB)
Reference Area

SPECIES	**Individuals Per Acre**
Artemisia tridentata	209.16
Juniperus osteosperma	26.14
Juniperus scopulorum	130.72
Pinus edulis	52.29
Quercus gambelii	1333.37
Symphoricarpos oreophilus	339.88
TOTAL	**2091.57**

Table 3-28: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Meadow (M) Proposed Disturbed	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Artemisia nova	1.50	6.54	5.00
Rosa woodsii	11.75	12.07	60.00
FORBS			
Achillea millefolium	3.50	6.73	40.00
Equisetum arvensis	0.75	2.38	10.00
Iris missouriensis	24.00	13.19	95.00
GRASSES (and grass-likes)			
Carex microptera	7.75	10.43	30.00
Elymus lanceolatus	1.25	3.11	15.00
Elymus smithii	0.25	1.09	5.00
Elymus trachycaulus	0.50	2.18	5.00
Juncus arcticus	24.00	9.95	100.00
Koeleria nitida	1.50	4.77	10.00
Phleum pratensis	0.50	2.18	5.00
Poa pratensis	7.50	7.66	60.00
Poa secunda	1.25	3.11	15.00

Table 3-29: Coal Hollow Project. Total Cover and Composition (2007)		
Meadow (M) Proposed Disturbed		
A. TOTAL COVER	Mean Percent	Standard Deviation
Understory Cover (u)	86.00	7.18
Litter	8.25	4.69
Bareground	4.05	1.96
Rock	1.70	3.05
B. % COMPOSITION (u)		
Shrubs	15.88	15.08
Forbs	32.54	16.94
Grasses	51.58	13.82

Table 3-30: Coal Hollow Project. Woody Species Density (2007).

Meadow

Proposed Disturbed

SPECIES	Individuals Per Acre
Rosa woodsii	384.06
TOTAL	384.06

Table 3-31: Coal Hollow Project. Living Cover and Frequency by Plant Species (2007).

Meadow (M) Reference Area	Mean Percent	Standard Deviation	Percent Frequency
SHRUBS			
Rosa woodsii	9.75	9.68	65.00
FORBS			
Achillea millefolium	0.25	1.09	5.00
Iris missouriensis	32.37	12.50	100.00
GRASSES (and grass-likes)			
Elymus lanceolatus	0.50	1.50	10.00
Juncus arcticus	33.00	13.55	100.00
Poa pratensis	11.00	14.20	60.00
Poa secunda	1.25	3.83	10.00

Table 3-32: Coal Hollow Project. Total Cover and Composition (2007)

Meadow (M) Reference Area		
A. TOTAL COVER	Mean Percent	Standard Deviation
Total Living Cover (u)	88.50	5.94
Litter	7.85	4.98
Bareground	2.65	2.03
Rock	1.00	0.00
B. % COMPOSITION (u)		
Shrubs	11.04	11.01
Forbs	37.38	13.75
Grasses	51.57	13.78

Table 3-33: Coal Hollow Project. Woody Species Density (2007).

Meadow (M) Reference Area	
SPECIES	**Individuals Per Acre**
Rosa woodsii	2225.69
TOTAL	**2225.69**

321.200. Productivity

Productivity measurements were recorded for the plant communities of the permit area during the same sample period as described in section 321.100 above. Production estimates for the communities at that time are shown in Table 3-34.

Table 3-34: Biomass Production of Plant Communities in the Coal Hollow Permit Area

(1) *Estimates* (from soil and approx. vegetation types) - Source: U.S. Department of Agriculture SCS (NRCS). July 1990. Soil Survey of Panguitch area, Utah: Parts of Garfield, Iron, Kane, and Piute Counties.

(2) *Actual measurements*. - Source: Cedar Creek Associates (1986) *in* Mine Permit Application. 1987. Utah International, Inc., Alton Coal Project, Alton, Utah.

(*) *Estimates* - Source: Fieldwork during 2007 by Mt. Nebo Scientific, Inc.

MAP SYMBOL (see *Vegetation Map*, Drawing 3-1)	PLANT COMMUNITY	Pounds/Acre (1)	Pounds/Acre (2)
SB	Sagebrush/Grass	750	762
P	Pasture Land (*)	1100	1100
M	Meadow	2000	2121
P-J	Pinyon-Juniper	50	33
OB	Oak Brush [*called Mountain Brush* (2)]	1500	1471
RB/SB	Rabbitbrush/Sagebrush (*)	700	700

322. **FISH AND WILDLIFE INFORMATION**

322.100. Agency Consultation and Studies Conducted

Initial consultations have been made to appropriate state and federal agencies regarding threatened, endangered, and sensitive plant and animal species and their habitats in and adjacent to the Coal Hollow permit area. A summary of this work follows.

- In 2005, a review of the Utah Heritage Program database for sensitive species in the proposed project and adjacent areas was accomplished.

- A spreadsheet has been prepared that shows applicable notes from previous biological surveys of the area.

- Biologists from the USDA Dixie National Forest have been contacted. Life histories and analyses of the species in their forest and in close proximity to the Coal Hollow Project area that have been listed as endangered, threatened, candidate, and management indicator species has been prepared to be used for project planning and agency consultations.

- Files from the offices of *Mt. Nebo Scientific, Inc.* regarding sensitive species have been consulted for the project area.

- A sage-grouse lek had been located in the area by biologists from the Bureau of Land Management (BLM) and the State of Utah, Division of Wildlife Resources (DWR). In the Spring of 2005 biologists from the BLM captured, collared and began monitoring 4 sage-grouse birds to study the lifecycle and migrating patterns of the local birds.

- In June 2005, a field survey for potential habitat of sensitive species within the project and adjacent areas was conducted by N. Duane Atwood, Ph.D. and Patrick D. Collins, Ph.D.

- In April 2006, a biologist, Steven L. Petersen, Ph.D., representing the Coal Hollow Project began independent studies and also began participating with the BLM and DWR in sage-grouse studies in the project area.

- In May 2006, a raptor survey by helicopter was conducted by Talon Resources, Mt. Nebo Scientific, Inc., and DWR of the permit area and adjacent areas.

- In August 2006 sensitive plant species surveys were conducted during quantitative sampling of specific areas proposed disturbed and reference areas for mining year one of the project.

- In 2007 the team has continued studies of the sage-grouse with biologists from DWR, the BLM, Southern Utah University (SUU), and the Coal Hollow Project by capturing, taking blood samples, and placing radio transmitters on several birds from March through May.

- In April 2007, two helicopter flights, arranged by Coal Hollow Project, were conducted to search for satellite leks of the sage-grouse.

- In May 2007, another raptor survey by helicopter was conducted by DWR that included the permit area and adjacent areas.

- In September 2007, sensitive plant species surveys were conducted during quantitative sampling of additional proposed disturbed and reference areas for mining years one through three of the project.

- In September 2007, additional quantitative sampling was conducted in meadow areas outside the permit area to be used as a companion study with other areas.

322.200. Site-Specific Resource Information

A review of the Utah Heritage Program database for sensitive species in the proposed mine site and adjacent areas has been accomplished. Field maps with locations of these species have been prepared and have been used for additional surveys and will continue to be used for future biological studies.

Due to the sensitivity of these species, specific location information is considered confidential and has not been submitted in this application. However, review of this information by the regulatory authorities can be arranged .

322.210. Threatened, Endangered, and Candidate Plant and Animal Species

Table 3-35 shows a list of the plant and animal species that are federally listed as threatened, endangered, or candidates for this designation for Kane County, Utah.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah			
SCIENTIFIC NAME	**COMMON NAME**	**STATUS***	**NOTES SPECIFIC TO PROJECT AREA**
PLANTS			
Asclepias welshii	Welsh's Milkweed	T	~~Carex specuicolaNavajo SedgeT~~Welsh's milkweed, occurs in Kane County, Utah, as well as in immediately adjacent Coconino County, Arizona. This plant grows on dunes derived from Navajo Sandstone. This formation and habitat is not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
Cycladenia humilis var. jonesii	Jones Cycladenia	T	Jones' cycladenia,is a Federally listed threatened plant found only in the canyonlands of the Colorado Plateau in Emery County, Garfield County, Grand County, and Kane County, Utah (also found in adjacent Coconino County, Arizona). This plant occurs in gypsiferous soils that are derived from the Summerville, Cutler, and Chinle formations; they are shallow, fine textured, and intermixed with rock fragments. These formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
Lesquerella tumulosa	Kodachrome Bladderpod	E	Kodachrome bladderpod, is a federally listed endangered plant that is an endemic found only in Kane County, Utah. This species is found on shallow soils that are fine textured, intermixed with shale fragments, and derived from the Winsor Member of the Carmel Formation, where it grows on bare shale knolls and slopes in scattered pinyon-juniper communities. These formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
Pediocactus sileri	Siler Pincushion Cactus	T	This plant is federally listed as threatened. It occurs in Kane and Washington counties in Utah, plus adjacent Coconino and Mohave counties in Arizona The cactus is usually found on the white, occasionally red, gypsiferous and calcareous sandy or clay soils derived from the various members of the Moenkopi Formation, but it is sometimes found on the Kaibab Formation. Siler pincushion cactus occurs in warm desert shrub, sagebrush-grass, and at its upper limits, in pinyon-juniper communities, at lower elevations that area present in the Alton area. Additionally, these formations and habitats are not found within the permit area or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
ANIMALS			
Cicindela limbata albissima	Coral Pink Sand Dunes Tiger Beetle	C	The only known populations in the world for this species are located at the Coral Pink Sand Dunes in the extreme southwest corner of Kane County, Utah. The species occupies dune habitat, which is not found in the Alton area. There should be no impacts to this species as a result of Alton Coal Mine.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah			
Coccyzus americanus	Yellow-billed Cuckoo (possible)	C	DWR database information states that historically, cuckoos were probably common to uncommon summer residents in Utah and across the Great Basin. The current distribution of yellow-billed cuckoos in Utah is poorly understood, though they appear to be an extremely rare breeder in lowland riparian habitats statewide. DWR information also states that currently, the range of the cuckoo is limited to disjunct fragments of riparian habitats from northern Utah, western Colorado, southwestern Wyoming, and southeastern Idaho southward into northwestern Mexico and westward into southern Nevada and California. Although the possibility exists that historically this species could be seen in Kane County, it is highly extremely unlikely that it occurs within the Alton Mine permit area due to the lack of habitat for this species. There should be no impacts to this species as a result of Alton Coal Mine.
Cynomys parvidens	Utah Prairie-dog	T	Like other prairie dog species, the Utah prairie dog form colonies in burrows for underground activities. DWR distribution maps do not show the habitat for this species to occur in Kane County, but "high-value" habitat does occur in adjacent counties. No prairie dog burrows have been located within the permit or adjacent areas. There should be no impacts to this species as a result of Alton Coal Mine.
Empidonax traillii extimus	Southwestern Willow Flycatcher	E	This species breeds in southwestern U.S. and winters in southern Mexico and Central America. It is a rare visitor of southern Utah. Its habitat is primarily riparian and the bird most frequently occurs in dense willow stands. This habitat does not occur in the project area; the adjacent areas have also been surveyed where suitable habitat for this species was not found.
Gila cypha	Humpback Chub (historical)	E	Humpback chub in Utah are now confined to a few white-water areas in the Colorado, Green, and White Rivers. These rivers do not occur in the study area. The project area is not within the Upper Colorado River Basin, a specific area delineated and directed to comply to the Recovery Program for this species. There should be no impacts to this species as a result of Alton Coal Mine.
Gilia elegans	Bonytail (historical)	E	~~Gymnogypes californianusCalifornia CondorExpHaliaeetus leucocephalusBald EagleT~~The bonytail is a very rare minnow originally native to the Colorado River system. The project area is not within the Upper Colorado River Basin, a specific area delineated and directed to comply to the Recovery Program for this species. There should be no impacts to this species as a result of Alton Coal Mine.
Oxyloma kanabense	Kanab Ambersnail	E	~~Ptychocheilus luciusColorado Pikeminnow (historical)E~~The only known locations for this species are in wetlands, springs and seeps approximately 6 mi. from Kanab, UT. This habitat in not found on or adjacent to the permit area for the proposed mine. There should be no impacts to this species as a result of Alton Coal Mine.

Table 3-35: List of Threatened, Endangered, and Candidate Plant & Animal Species in Kane County, Utah			
Strix occidentalis lucida	Mexican Spotted Owl	T	~~Xyrauchen texanusRazorback Sucker (historical)E~~In Utah the Mexican spotted owl is rare, but when it does occur it is sometimes in various forest types, but more commonly in steep rocky canyons, nesting in caves or cliffs of steep walled canyons. This habitat does not occur in the permit area, but does occur in the Dixie National Forest to the east and west of the Alton area. DWR has conducted raptor surveys for all potential raptor species in the project area and did not find habitat for the Mexican spotted owl. There should be no impacts to this species as a result of Alton Coal Mine.
* T=Threatened, E=Endangered C=Candidate, Exp=Experimental			

In summary, based on the information provided above and studies conducted to-date, no threatened or endangered species have been located in the permit area.

322.220. <u>High Value Habitats</u>

The State of Utah, Division of Wildlife Resources (DWR) geographic information system (GIS) database was consulted for high-value habitats. Of the species maintained on the database, important habitat of four species have been mapped by DWR within or adjacent to the Coal Hollow Project area. These habitats are described below.

First, black bear (*Ursus americanus*) habitat was located on the east side of the permit area and continues east for some distance (Drawing 3-2). This habitat has been listed as "year-long" and classified as having "substantial" habitat by DWR.

Next, Rocky Mountain elk (*Cervus canadensis*) habitat was located in the area. "High-value" summer range was mapped throughout the entire area from the town of Alton south into Sink Valley. Additionally, year-long "substantial" habitat was located in areas southeast of the permit area (Drawing 3-3).

Mule deer (*Odocoileus hemionus*) habitat has also been mapped in the area by DWR. The habitat has been classified as "high-value" summer range and was located throughout the permit and adjacent areas (Drawing 3-4).

Finally, sage-grouse (*Centrocercus urophasianus*) habitat has been documented in the project area. DWR has mapped much of the area to be brood habitat (Drawing 3-5). Sage-grouse populations continue to be monitored in the area by biologists from DWR, Bureau of Land Management (BLM), Southern Utah University (SUU), and the Coal Hollow Project. The only lek in the vicinity including those areas around Alton and Sink Valley was located west of the Swapp Ranch. This lek was within the permit area boundary. A site-specific study called "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" has been conducted for the Coal Hollow Project and has been included in this document (see **Appendix 3-1**). Follow-up studies of the sage-grouse in the area are described in a report called *"Sage-grouse Distribution and Habitat Improvement in Alton, Utah*" (see **Appendix 3-3**).

In 2006 to the present, biologists representing the Coal Hollow Project have been involved with a previously assembled team of biologists that have been studying the populations in the area. In 2007, the team captured, took blood samples for DNA analyses, and placed radio collars on several birds. For more details refer to **Appendix 3-3**.

In addition to studying the sage-grouse birds as described above, techniques to improve habitat for the birds is currently being conducted. An effort by the U.S. Department of Interior, Bureau of Land Management (BLM) and the State of Utah, Division of Wildlife Resources (DWR) removed many of the juniper trees that have encroached the valley by grinding them up by chipping equipment. These areas can be easily seen on the new *Vegetation Map, Drawing: 3-1.* These areas are delineated as "SB (chipped)" on the map.

Because they provide perching structure for predatory species, single juniper trees scattered throughout sagebrush communities are known to discourage nesting by sage-grouse. To enhance sage-grouse nesting habitat within the permit area, juniper trees that have encroached some of the sagebrush communities in the valleys of the permit area have been removed by a track hoe using a large grapple claw. This equipment can pull the trees out of the ground, including the roots. To date, it has been estimated that ~~2~~8,000 juniper trees have been removed by this technique. In doing so, the technique causes relatively minor impacts to the sagebrush component of the community.

In addition to the habitat improvements mentioned above for sage-grouse, seed mixtures to restore pasture lands disturbed by mining will include plant species that are used by the birds for food, cover and breeding. Moreover, one area that is presently dominated by grass species for domestic livestock use, will be seeded with plants that include species known to provide nesting habitat for sage-grouse such as big sagebrush and black sagebrush (see Postmining Land Use, Chapter 4, for more detailed information).

322.230. Other Species or Habitats

To date, no other species or habitats have been identified through agency consultation or field studies that require special protection under state or federal law, however, if they are found through the permitting process, they will be appropriately addressed and monitored.

A vegetation map has been prepared that delineates the plant communities in the permit area. The map also shows adjacent areas including those plant communities that will be impacted by the proposed county road realignment (Drawing: 3-1).

322.300. Fish and Wildlife Service Review

Upon request, the State of Utah, Division of Oil, Gas & Mining (DOGM) will provide the resource information required under R645-301-322 and the protection and enhancement plan required under R645-301-333 to the U.S. Fish and Wildlife Service Regional or Field Office for their review. This information will be provided within 10 days of receipt of the request from the Service.

Because they provide perching structure for predatory species, single juniper trees scattered throughout sagebrush communities are known to discourage nesting by sage-grouse. To enhance sage-grouse nesting habitat within the permit area, juniper trees that have encroached some of the sagebrush communities in the valleys of the permit area have been removed by a track hoe using a large grapple claw. This equipment can pull the trees out of the ground, including the roots. To date, it has been estimated that more than 8,000 juniper trees have been removed by this technique. In doing so, the technique causes relatively minor impacts to the sagebrush component of the community.

In addition to the habitat improvements mentioned above for sage-grouse, seed mixtures to restore pasture lands disturbed by mining will include plant species that are used by the birds for food, cover and breeding. Moreover, one area that is presently dominated by grass species for domestic livestock use, will be seeded with plants that include species known to provide nesting habitat for sage-grouse such as big sagebrush and black sagebrush (see Postmining Land Use, Chapter 4, for more detailed information).

322.230. Other Species or Habitats

To date, no other species or habitats have been identified through agency consultation or field studies that require special protection under state or federal law, however, if they are found through the permitting process, they will be appropriately addressed and monitored.

A vegetation map has been prepared that delineates the plant communities in the permit area. The map also shows adjacent areas including those plant communities that will be impacted by the proposed county road realignment (Drawing: 3-1).

322.300. Fish and Wildlife Service Review

Upon request, the State of Utah, Division of Oil, Gas & Mining (DOGM) will provide the resource information required under R645-301-322 and the protection and enhancement plan required under R645-301-333 to the U.S. Fish and Wildlife Service Regional or Field Office for their review. This information will be provided within 10 days of receipt of the request from the Service.

323. MAPS AND AERIAL PHOTOGRAPHS

323.100. Reference Area Maps

Several vegetation maps have been prepared for the Coal Hollow Project. A revised vegetation map has been prepared that includes all vegetation sample areas, plus other updated map information [Vegetation Map, Drawing 3-1, (12/26/07)]. The new map replaces the previous vegetation maps. This new map includes reference areas, or plant communities sampled that are similar to those that have been proposed for disturbance by mining activities. These reference areas will be compared to those areas proposed for disturbance during the initial studies for the mine site and will consequently be used as revegetation success standards at the time of final reclamation of mined areas. Reclamation is planned immediately after portions of the land are mined (see Chapter 5).

323.200. Sample Area Maps

Elevations, locations of monitoring stations, proposed disturbed areas, reference areas, and other areas used to gather data for fish and wildlife, and any special habitat features, have been delineated on the aforementioned new vegetation map.

323.300. Protection and Enhancement of Fish & Wildlife Maps

Each facility to be used to protect and enhance fish and wildlife and related environmental values have been represented on the new maps.

323.400. Plant Communities Map

An initial vegetation map was prepared that delineated the plant communities that existed within the Coal Hollow Project permit area. This **first** map was prepared by delineating the plant communities from an existing vegetation map to a permit quadrangle map (see Section 321.100 for more details). However, a new flight was conducted in 2006 that provided aerial photography with more detailed information to be used to update many maps of the project area. Consequently, a **second** vegetation map was prepared using the new aerial photography (along with ground-truthing), and submitted along with the first map to DOGM (MRP submittal dated May 25, 2007). Finally, a **third** vegetation map was prepared to reflect information and to show new sample areas within the plant communities of the permit and adjacent areas [see *Vegetation Map, Drawing 3-1, (12/26/07)*]. This map **replaced** the first and second maps and was submitted to DOGM (MRP submittal dated January 15, 2008.

330. OPERATION PLAN

331. MINE PLAN & RECLAMATION TIMING

In each mined segment, the mine plan includes redistributing subsoil and topsoil followed by seeding this segment with the final seed mix contemporaneously, or at the same time the mining begins in the next segment. The mine plan has been engineered to disturb the smallest practicable area at any one time. With prompt establishment and maintenance of vegetation, immediate stabilization of disturbed areas will minimize surface erosion. Details of the plan have been provide in Chapter 5 of this document.

332. **SUBSIDENCE**

Because mining in the Coal Hollow Project area will be a surface operation, and subsidence is usually associated more with underground mining, it is not considered a factor for the Coal Hollow Project. However, current elevation of the existing topography may be slightly altered in the mining and reclamation operations. Reclamation has been planned to minimize the impact to the renewable resources identified in this section by promptly reclaiming each mine segment contemporaneously by controlling erosion and re-seeding with a mixture of native plant species that will re-establish the plant communities to vegetative cover that will be diverse, effective, permanent, and consistent with the postmining land use. More details regarding postmining land and topography have been provided in Chapter 4 and Chapter 5 of this document, respectively.

The mine plan is not expected to negatively impact the plants and wildlife in the Coal Hollow Project area. Onsite revegetation research and sage-grouse mitigation plans have been designed. Details of this work have been made available to DOGM specialists for their comments and participation in the process.

333. PROCEDURES TO MINIMIZE ADVERSE IMPACTS TO FISH & WILDLIFE

The Coal Hollow Project will minimize disturbances and adverse impacts to fish and wildlife and related environmental values during coal mining and reclamation operations. The project will comply with the Endangered Species Act of 1973 during coal mining and reclamation operations. The location and operation of haul and access roads and support facilities will be placed to avoid or minimize impacts on important fish and wildlife species or other species protected by state or federal law. Enhancement of such resources will be achieved, where practicable. An example is provided below for sage-grouse habitat.

After consultation with appropriate agencies and biologists regarding habitats and sensitive species, the sage-grouse and its habitat were of greatest concern in the area. There has been a decreasing trend in the populations of this species since 1964 (see **Appendix 3.1** and **Appendix 3-3** for more details). There was a general consensus among the biologists and agencies consulted that due to the~~: 1)~~ marginal habitat in the Alton Amphitheater area, ~~2)~~the loss of habitat in recent years for nesting and brood-rearing and ~~3)~~the relatively low population numbers in the area, that the local population of sage-grouse is vulnerable to elimination, regardless of mining activities proposed by the Coal Hollow Project. Accordingly, the following measures to minimize impacts and enhance habitat for this species have been proposed and are subject to further consideration by the operator and regulatory agencies.

~~**Short-Term Mitigation Plan**~~

~~The following information was taken directly from the "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" **(Appendix 3-1)**.~~

~~In addition to ensuring the protection of nearby grassland and shrubland for alternate breeding and nesting areas,~~Biologists representing the regulatory agencies, land managers, academia and the coal mine operator, the primary goals for the Alton sage-grouse population includes:

- Minimize impacts to the birds from the mining activities.
- Enhance current sage-grouse habitat.
- Create a conservation area for the sage-grouse that will never be mined.
- Provide a corridor between north (Hoyt's Ranch) and south (Alton Sink Valley) populations to promote gene transfer and increase population numbers.
- Restore land disturbed by mining activities ~~will be minimized so that the lowest disturbance will be created during the breeding season at areas adjacent to the original lek. After mining has been completed, reclamation specialists will return the original grade and valley form to pre-disturbance conditions. Reclamation will include seeding similar plant species with comparable plant composition, structure and function as those of the original plant community. In sites used by sage-grouse for breeding and roosting that had previous livestock grazing, livestock will be used post-reclamation to maintain similar vegetation characteristics as pre-mining conditions.~~

~~Intact sagebrush stands will be avoided for storing mined subsoil and topsoil piles. Sites could be~~

~~selected for storing these materials that are distant from prime~~to enhance sage-grouse habitat~~, in particular potential nesting habitat. Coal processing equipment will be located in areas that create the least possible disturbance to sage-grouse and sage-grouse habitat. Intact sagebrush sites will be cleared of all young juniper trees with the use of chainsaws or hand tools. Trees will be removed from these stands. Juniper woodlands surrounding intact stands can be cut back to increase patch size and increase the amount of area that has the potential for nest site selection by hens.~~

~~Long-Term~~.

Sage-Grouse Short-Term Mitigation Plan

The following information was taken directly from the "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" (**Appendix 3-1**) ~~and "*Sage-grouse Distribution and Habitat Improvement in Alton, Utah*"~~and the followup document called "*Alton Sage-Grouse Habitat and Mitigation Plan*" (**Appendix ~~3-3~~).
3-5).**

In addition to ensuring the protection of nearby grassland and shrubland for alternate breeding and nesting areas, mining activities will be minimized so that the lowest disturbance will be created during the breeding season at areas adjacent to the original lek. A lek area will be disturbed during mining activities that could potentially displace birds from typical mating activities. To encourage mating behavior during the breeding season, decoys and mating calls will be used to lure birds to nearby alternative sites positioned away from the disturbed area. Research has shown that birds will shift mating activities toward decoys and recorded bird calls. Both silhouette and 3-dimensional decoys (with bright white coloration) will be used to encourage sage-grouse mating activity (see **Appendix 3-5**)

After mining has been completed, reclamation specialists will return the original grade and valley form to pre-disturbance conditions. Reclamation will include seeding similar plant species with comparable plant composition, structure and function as those of the original plant community. In sites used by sage-grouse for breeding and roosting that had previous livestock grazing, livestock will be used post-reclamation to maintain similar vegetation characteristics as pre-mining conditions.

Intact sagebrush stands will be avoided for storing mined subsoil and topsoil piles when possible. Intact sagebrush sites will be cleared of all young juniper trees with the use of a compact excavator with a grappling claw or hand tools such as chainsaws. Trees will be removed from these stands. Juniper woodlands surrounding intact stands can be cut back to increase patch size and increase the amount of area that has the potential for nest site selection by hens.

Sage-Grouse Long-Term Mitigation Plan

The following information was taken directly from the "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" **(Appendix 3-1)**, "*Sage-grouse Distribution and Habitat Improvement in Alton, Utah*" **(Appendix 3-3)** and "*Alton Sage-Grouse Habitat and Mitigation Plan*" **(Appendix 3-5)**.

Juniper Removal

A significant contribution that mining can provide for enhanced sage-grouse habitat is the removal of juniper from the Alton valley. The removal of trees during mining operations with subsequent reclamation activities will create conditions that promote grass, forb and eventually sagebrush establishment. Two years after juniper was removed from plots located in eastern Oregon, Bates et al. (2000) recorded a 200-300% increase in percent cover and production of herbaceous vegetation. Increased plant community vigor results from decreased competition with juniper for subsurface resources (water, nutrients) and space. As a result, transpiration rates and soil surface evaporation rates will decrease and higher soil moisture will be available for plant growth and survival. Based on anecdotal, evidence, it is also possible that spring discharge will increase and seeps and spring may emerge that were lost with initial encroachment. This would provide more sites where birds would be able to obtain water during the summer and fall months.

Removing trees from extensive areas creates greater connectivity of suitable habitat. In 2005, the BLM cleared portions of the land to increase sagebrush habitat. This improvement was beneficial for improving relatively small site conditions, however, the amount of land treated was minimal compared to the level needed to sustain the sage-grouse population in the Alton area. In 2007, the Coal Hollow Project removed over ~~2~~8,000 juniper trees that had encroached the sagebrush open areas. Long-term ~~mining~~ plans ~~will~~could include remove of hundreds of acres of juniper woodlands~~,~~ in a specific area adjacent to the Coal Hollow Project which would significantly ~~increasing~~increase conditions that are more suitable to sage-grouse nesting and ~~post-nesting~~post-nesting requirements. Current plans have been designed to provide a corridor for the sage-grouse in the Alton to intermix with the larger population located to the north, called the Heut's Ranch Lek (see below). This landscape-level operation could greatly enhance sagebrush restoration objectives by the BLM that is currently limited by constrained budgets and manpower.

Reestablishing Connectivity Between Alton and Heut's Ranch

Over time, juniper encroachment has likely been the primary factor in isolating the Alton sage-grouse population from nearby populations. ~~According to local sources, a~~ There is a larger sage-grouse population ~~is~~ located approximately 6 miles north of Alton. It is likely that migration once occurred between these populations allowing an exchange of individuals and genes between the two populations. Fragmentation of the landscape by juniper has likely resulted in minimal or no movement of birds between the two populations. Similarly, two populations that once occurred further south (near Kanab) have become locally extinct, likely due to the lack of connectivity with more northern populations. According to Fuhlendorf (2001), small populations of prairie chickens became disconnected from other larger populations with increased croplands and juniper invasion. These small populations became locally extinct due to the lack of migration and gene flow potential. Therefore, by reducing the degree of fragmentation caused by expanding juniper, the potential for migration and population sustainability is increased.

~~Primary brood-rearing habitat in the Alton valley is associated with alfalfa fields near the town of Alton. Birds likely utilize these areas due to the availability of forbs, insects, and water. To reduce the dependency of the birds on these areas, irrigated alfalfa fields will be created in Swapp Valley (south of the Swapp Ranch house).~~A plan has been made to restoring connectivity can be accomplished by removing juniper trees between these two populations on both private and public land. An area that is approximately 1,700 acres has been delineated that, with treatment, could provide connectivity between the two populations (**Appendix 3-5**). Funds will be provided by ACD to work with DWR to hire crews to cut and remove trees for a corridor through the 1,700 acres. It is anticipated that this habitat improvement will create access for birds to migrate between the two populations.

Establishment of a Core Sage-Grouse Conservation Area

The east end of the valley maintains one of the few remaining intact sagebrush stands in the valley. This area is located northeast of the lek and provides sites for roosting during the mating season (see Drawings 3-1 and 3-5). This area will not be mined, rather, it will be preserved to create a harbor area for bird breeding, nesting, and brood rearing. Within this "Conservation Area", habitat will be protected and enhanced for sheltering displaced sage-grouse, especially during the breeding and brood-rearing seasons (see also Appendix 3-1). All juniper trees that encroach into sagebrush communities within the permit area will be removed. This will be accomplished by felling and removing individual juniper trees while minimizing the impacts to the sagebrush community (see "Juniper Removal" above). In addition to ~~alfalfa, many sage-grouse forage species (forbs) will be included in the seed mix. This will increase brood-rearing habitat closer to breeding and nesting habitat. This in turn will reduce potential predation that occurs near towns by ravens, crows, cats, dogs and people. It will also reduce bird mortality associated with large-scale farming practices.~~

~~The Alton sage-grouse population could be enhanced by importing birds from nearby populations that are relatively large and stable. Captured and relocated birds (initially 10-15) in the Alton area will increase genetic diversity as well as stabilize population numbers to offset losses associated with disease and emigration (unrelated to mining activities). Additionally, birds from the Alton population (5-10) can be trapped and released in a nearby population through the mining period. Once complete, these birds can be trapped again and returned to the original Alton population. This will ensure the survival of members of the original Alton population.~~

juniper, Gambel oak (*Quercus gambelii*) may also be removed (in particular along the eastern foothills) to expand the sagebrush community and provide greater suitable habitat for sage-grouse. In addition to juniper and oak removal, sagebrush treatments (mechanical) can be applied to reduce shrub density in small areas (patches). Within these areas, forb species that are known to be important sage-grouse food will be seeded and established to provide an additional food source for hens and chicks, primarily during the brood rearing period. Grasses will also be seeded to provide additional hiding cover and a potential source of insects for chick foraging. These treatments will initially be done in a few, relatively small areas to determine whether forb and grass densities actually do increase and if birds are observed using these areas for foraging. If successful, these treatments can then be used in other areas where benefits are expected. Maintaining optimal shrub cover for nesting, brood rearing, predator avoidance, roosting, and as a source of shelter will remain the highest priority for these sites.

Habitat Reclamation Plan

~~Taken directly from the "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" (**Appendix 3-1**), the following habitat reclamation plan has been proposed.~~

Seed mixes that are used for reclamation will consist of native shrub, grass~~es~~ and forb species that provide cover and food~~;~~. In order to accelerate shrub re-establishment, bareroot or ~~potted~~containerize sagebrush and bitterbrush transplants will be planted. To ensure the integrity of the planting materials, indigenous seed and cuttings could be collected for reclamation. At Bryce Canyon National Park, seed and transplants obtained from indigenous materials had greater long-term survival and higher cover and production than commercial varieties of the same species (~~Petersen et al. 2004~~**Appendix 3-1**).

Cursory surveys conducted on April 30, 2006 found that there is a low probability that a dominant invasive species (i.e. cheatgrass, medusahead) could establish on reclaimed sites. However, post-reclamation surveys will be conducted for undesirable invasive plants. If a breakout does occur, mechanical ~~followed by~~and/or chemical treatments will be applied.

Primary brood-rearing habitat in the Alton valley is associated with alfalfa fields near the town of Alton. Birds likely utilize these areas due to the availability of forbs, insects, and water. To reduce the dependency of the birds on these areas, areas that are currently pasture lands will be returned to sagebrush/grass/forb communities. Seed mixtures for final reclamation have been created with this goal in mind.

Seeding and planting will occur in the fall season following the growing season and into dormancy, or in the spring if timing and conditions appear more favorable. During the following growing season, vegetation sampling will be conducted to monitor reclamation success. Measurements will be continued each year until the reclamation goals have been achieved. Additional seeding can be applied during subsequent years if the minimum standards of acceptance have not been achieved. Juniper seedlings found in reclaimed areas will be removed.

Monitoring Plan

~~Taken directly from the "*Alton Sage-Grouse Habitat Assessment and Mitigation Plan*" (**Appendix 3-1**), the following monitoring plan has been proposed.~~

~~Birds trapped and relocated to the Alton population will be collared with radio- collars. Birds will be monitored throughout the year to assess bird survival, nest site and nest success, brood-rearing sites, and key winter habitat areas. Lek counts will be conducted each year to determine the number of birds at the lek. Reclamation~~Reclaimed sites will be monitored to assess restoration success~~.~~ and plant establishment to determine if problem areas exist. Qualitative and quantitative data will be recorded at regular intervals. The qualitative data will include: site location, sample date, observers, slope, exposure, acreage, animal disturbance, erosion damage, dominant plant species observed, and other pertinent notes. Quantitative data recorded will include: total cover (living cover, rock, litter, bare ground), cover by species, composition, frequency, and woody species density.

Methods for quantitative monitoring will be as follows. Transect lines will be placed randomly on each of the revegetation sites. Random sample locations will then be placed from these transect lines and the aforementioned data will be recorded. Ocular methods with square meter quadrat will be used to provide cover and frequency data, whereas, point quarter and/or belt transects will be used to estimate woody species densities.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbacide, kill or remove the weeds mechanically (by shovel or other means).

Other Wildlife Enhancement Information

The active mine areas will usually be less than 120 acres. Once an active area is mined, reclamation will begin immediately by replacing overburden and topsoil. Seeding will then be implemented in the late-fall (or early spring if conditions are deemed favorable). In other words, reclaimed pits will be seeded with the final seed mixture less than one year following redistribution of overburden topsoil, and in many cases these activities will occur within months. If the seeding window is not appropriate following re-distribution of the soils, the area will be treated with a tackifier to control erosion by wind and water.

Sagebrush and Other Habitats

With the establishment of desirable plant species for sage-grouse in the sagebrush communities, sagebrush obligate species habitat will also be improved. Birds that depend on these communities include sage sparrows (*Oreoscoptes montanus*), sage thrasher (*Amphispiza belli*), and Brewer's sparrow (*Spizelis breweri*). Also, mule deer habitat will increase, especially with the establishment of antelope bitterbrush (*Purshia tridentata*) and other palatable browse species that have been added to the seed mixtures. Grassland

development will also increase forage for elk (*Cervus canadensis*). ~~Reclaimed sites will be monitored to assess utilization by these~~ Other species such as snowberry (*Symphoricarpos oreophilus*) and serviceberry (*Amelanchier utahensis*) have been included in final revegetation seed mixtures at the mine site and should prove beneficial for black bear (*Ursus americanus*).

The total number of acres of the sagebrush community that will be disturbed by the Coal Hollow Project in 139 acres. As mentioned, this acreage will be restored to sagebrush communities. Moreover, there will be 157 acres of pasture lands that were once sagebrush communities, but have been altered by past land management practices, will be returned to sagebrush. In summary, the Coal Hollow Project area **currently has 139 acres of sagebrush** communities, plus approximately 35 acres that will remain undisturbed by mining that are located in the Conservation Area. Following final reclamation, there will be nearly **300 acres that are returned to sagebrush**, the community so important of the sage-grouse and other wildlife species.

~~To provide consistent monitoring and assessment, plans are being discussed to employ a graduate student from an established university to use this project as the basis for a graduate thesis. This would provide peer-reviewed research and monitoring of this project. It would also provide a mechanism for publishing the results of this project as a source of information and knowledge that~~

~~can be applied to similar work in other areas.~~

Wet Meadow Habitat

There are a variety of wildlife species that utilize the wet meadow habitat of the area. There is a total of 56 acres of this habitat in the permit area. About half, or 28 acres, of this habitat will be disturbed by mining operations. Additionally, 6 acres of this habitat will be left undisturbed and is located in the Conservation Area described above.

Because the water source and recharge area for the wet meadows will not be impacted by mining, and the same soils and overburden that was removed by mining activities will be replaced for the root zone (or approximately the top 4 ft) at the time of final reclamation, it is expected that the soil moisture necessary to restore and maintain this habitat will soon return to its present conditions. Additionally, the reclaimed areas will be seeded with the same species currently found in these meadows, some of which could be collected onsite. Also, these plant species are known to easily disperse and reestablish naturally if similar soils and hydrology have been restored.

340. **RECLAMATION PLAN**

341. **REVEGETATION**

This document contains the revegetation plan for final reclamation of all lands disturbed by coal mining and reclamation operations, except water areas and the surface of roads approved as part of the postmining land use, as required in R645-301-353 *through* R645-301-357. It also shows how the Coal Hollow Project will comply with the biological protection performance standards of the State Program.

341.100. Reclamation Timetable

A detailed schedule and timetable for the completion of each major step in the mine plan has been included in Chapter 5 of the MRP. Briefly, the mine will conduct operations in one area (segment) at a time. No more than 40 acres will be disturbed at one time for mining. Once mined, the plan includes redistributing subsoil and topsoil followed by seeding this segment with the final seed mix contemporaneously, or at the same time the mining of the next segment begins. However, seeding will be accomplished only in appropriate periods (usually late-fall, but early-spring could also be an option). The mine plan has been engineered to disturb the smallest practicable area at any one time. With prompt establishment and maintenance of vegetation, immediate stabilization of disturbed areas will minimize surface erosion. Details of the plan has been included in Chapter 5 of this document.

341.200. Reclamation Description

The Coal Hollow Project will be reclaimed and revegetated to meet the appropriate postmining land use. Most areas will be reclaimed to the native plant communities that existed prior to mining conditions. Other areas will be reclaimed to enhance habitat for sage-grouse or other wildlife species. Finally, in those areas where the landowner requests a change in the plant community to increase productivity for domestic livestock, they will be reclaimed accordingly.

341.210. Seed Mixtures

Revegetation seed mixtures for each plant community disturbed by mining activities in the Coal Hollow Project area are given in this section. Table 3-36 shows the plant communities that may eventually be disturbed by mining operations at the Coal Hollow Project area.

Table 3-36: Vegetation Communities of the Coal Hollow Permit Area Proposed for Disturbance

MAP SYMBOL (see *Vegetation Map, Drawing 3-1*)	PLANT COMMUNITY
S/G	Sagebrush/Grass
P	Pasture Land
P-J	Pinyon-Juniper
M	Meadow

Table 3-36: Vegetation Communities of the Coal Hollow Permit Area Proposed for Disturbance	
OB	Oak brush
RB/SB	Rabbitbrush/Sagebrush

Seed mixtures for each disturbance type are shown on Tables 3-37 *through* 3-42. These rates have been based on drill seeding methods described in this document. When broadcast seeding is employed these rates will be doubled.

Table 3-37: Revegetation Seed Mixture for the Sagebrush/Grass Community at the Coal Hollow Project

	Rate** (# PLS/Ac)	Seeds/ft^2
SHRUBS		
*Artemisia nova**	0.20	4.16
*Artemisia tridentata**	0.10	5.74
Ceratoides lanata	3.00	3.79
Purshia tridentata	15.00	5.17
Symphoricarpos oreophilus	3.00	5.17
FORBS***		
Achillea millefolium	0.03	1.91
Hedysarum boreale	5.00	3.86
Linum lewisii	0.70	4.47
Lupinus argenteus	15.00	4.30
Penstemon palmeri	0.30	4.20
Sphaeralcea grossulariifolia	0.40	4.59
Viguiera multiflora	0.20	4.84
GRASSES		
Elymus smithii	1.50	4.34
Elymus trachycaulus	1.50	5.51
Poa pratensis	0.10	5.00
Poa secunda	0.20	4.25
Stipa hymenoides	1.00	4.32
TOTALS	**47.23**	**75.60**

* This species could also to be planted by containerized seedlings at a rate of 200 plants per acre to enhance sage-grouse habitat.

** Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

*** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium, Agoseris glauca, Crepis acuminata, Gayophytum spp., Lomatium spp., Tragopogon dubius, Trifolium spp.*

Table 3-38: Revegetation Seed Mixture for the Pasture Lands at the Coal Hollow Project

(Final determination to be made by landowners)	Rate* (# PLS/Ac)	Seeds/ft^2
SHRUBS		
FORBS**		
Achillea millefolium	0.04	2.54
Astragalus cicer	1.50	4.99
Hedysarum boreale	6.00	4.63
Linum lewisii	1.00	6.38
Medicago sativa	1.00	4.82
GRASSES		
Bromus inermis	1.00	2.87
Dactylis glomeratus	0.20	3.00
Elymus smithii	1.50	4.34
Elymus lanceolatus	1.50	5.30
Elymus junceus	1.00	4.02
Elymus hispidus	2.00	4.27
Phleum pratensis	0.20	5.97
Poa pratensis	0.10	5.00
TOTALS	**17.04**	**58.14**

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium, Agoseris glauca, Crepis acuminata, Gayophytum spp., Lomatium spp., Tragopogon dubius, Trifolium spp.*

Table 3-39: Revegetation Seed Mixture for the Pinyon-Juniper Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft^2
SHRUBS		
Amelanchier utahensis	5.00	2.96
Artemisia nova	0.20	4.16
Artemisia tridentata vaseyana	0.07	4.02
Ceratoides lanata	3.00	3.79
Purshia tridentata	12.00	4.13
Symphoricarpos oreophilus	2.50	4.30
FORBS		
Artemisia ludoviciana	0.04	4.13
Eriogonum umbellatum	1.00	4.80
Hedysarum boreale	5.00	3.86
Lupinus argenteus	15.00	4.30
Sphaeralcea coccinea	0.50	5.74
Viguiera multiflora	0.20	4.84
GRASSES		
Elymus spicatus	1.00	3.21
Elymus smithii	1.50	4.34
Elymus trachycaulus	1.50	5.51
Poa pratensis	0.10	5.00
Poa secunda	0.20	4.25
Stipa hymenoides	1.00	4.32
TOTALS	**49.81**	**77.67**

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

Table 3-40: Revegetation Seed Mixture for the Meadow Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft^2
SHRUBS		
FORBS**		
Iris missouriensis	15.00	7.23
Achillea millefolium	0.10	6.36
GRASSES (or Grass-likes)		
Carex microptera	0.40	7.78
Carex nebrascensis	0.50	6.13
Elymus trachycaulus	2.00	7.35
Phleum pratensis	0.20	5.97
Poa pratensis	0.10	5.00
Poa secunda	0.30	6.37
Scirpus americanus.	2.00	8.26
Sporobolus airoides	0.20	8.03
TOTALS	**20.80**	**68.47**

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium, Agoseris glauca, Crepis acuminata, Gayophytum spp., Lomatium spp., Tragopogon dubius, Trifolium spp.*

Table 3-41: Revegetation Seed Mixture for the Oak Brush Community at the Coal Hollow Project

	Rate* (# PLS/Ac)	Seeds/ft²
SHRUBS		
Amelanchier utahensis	10.00	5.92
Artemisia nova	0.20	4.16
Artemisia tridentata var. vaseyana	0.07	4.02
Cercocarpus montanus	3.00	4.06
Purshia tridentata	12.00	4.13
Symphoricarpos oreophilus	3.00	5.17
Ephedra viridis	8.00	4.59
FORBS		
Artemisia ludoviciana	0.04	4.13
Sphaeralcea coccinea	0.40	4.59
Vicia americana	12.00	5.51
Viguiera multiflora	0.20	4.84
GRASSES		
Bromus carinatus	2.00	4.59
Elymus spicatus	1.50	4.82
Elymus trachycaulus	1.50	5.51
Poa pratensis	0.10	5.00
Poa secunda	0.20	4.25
Stipa hymenoides	1.00	4.32
TOTALS	**55.21**	**79.62**

* Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

Table 3-42: Revegetation Seed Mixture for the Rabbitbrush/Sagebrush Community (*disturbed Sagebrush/Grass Community*) at the Coal Hollow Project

	Rate** (# PLS/Ac)	Seeds/ft^2
SHRUBS		
*Artemisia nova**	0.20	4.16
*Artemisia tridentata**	0.10	5.74
Ceratoides lanata	3.00	3.79
Purshia tridentata	15.00	5.17
Symphoricarpos oreophilus	3.00	5.17
FORBS***		
Achillea millefolium	0.03	1.91
Hedysarum boreale	5.00	3.86
Linum lewisii	0.70	4.47
Lupinus argenteus	15.00	4.30
Penstemon palmeri	0.30	4.20
Sphaeralcea grossulariifolia	0.40	4.59
Viguiera multiflora	0.20	4.84
GRASSES		
Elymus smithii	1.50	4.34
Elymus trachycaulus	1.50	5.51
Poa pratensis	0.10	5.00
Poa secunda	0.20	4.25
Stipa hymenoides	1.00	4.32
TOTALS	**47.23**	**75.60**

* This species could also to be planted by containerized seedlings at a rate of 200 plants per acre to enhance sage-grouse habitat.

** Based on drill seeding methods. The number reflects the pounds of pure live seed (PLS) per acre.

*** Seeds used may be based on commercial availability. Other forb species that would be beneficial for sage-grouse enhancement include: *Achillea millefolium, Agoseris glauca, Crepis acuminata, Gayophytum spp., Lomatium spp., Tragopogon dubius, Trifolium spp.*

341.220. Planting & Seeding Methods

Seedbed Preparation & Analyses

The final seedbed of the reclaimed areas will be prepared by first replacing the subsoil and topsoil in the same order it existed prior to removal by the mining activities. -Next, a basic ~~soil~~topsoil (top 8 inches of reclamation profile) sampling regime will be implemented prior to seeding that should identify fertility problems and will provide a basis for determining necessary soil amendments. The parameters analyzed ~~may include:~~

- ~~Electrical conductivity (EC)~~
- ~~Sodium adsorption ratio (SAR)~~
- ~~pH~~
- ~~Texture~~
- ~~Organic matter~~

will be:

- Available phosphorus (P)
- Soluble Potassium (K)
- ~~Nitrate~~

Nitrate-Nitrogen

One composite sample will be collected from approximately every 2 to 5 acres based on soil types and variability. Each composite will be comprised of at least 4 su-samples.

Pre-testing of the soils has been conducted as part of the soils survey. Results from the pre-testing of topsoil and subsoil can be viewed in Table C-1 of Appendix 2-1 (native topsoil and subsoil) and Table C-2 (samples from core hole/overburden pits) of Appendix 2-1.

If heavy equipment operation results in excessive soil compaction at the surface of the reclaimed areas, they will then be ripped, disked, and harrowed to loosen the seedbed prior to seeding. Excessive compaction that could impact seeding success will be determined by observation and judgment of an environmental professional. In other areas where less compaction has occurred, the areas will be disked and harrowed. The disking and harrowing of all areas will be done parallel with the contour wherever possible to decrease the potential for water erosion downslope. In other areas where compaction is not a problem, dozer tracking can be used to roughen the surface, and to trap seed, fertilizer, mulch, and other amendments as well as decrease erosion by wind and water. In such cases, seeding will be done immediately after this treatment, whereas soil amendments, where required, would be applied over the surface during seedbed preparations.

~~In some of the more sloped areas that will be reclaimed to the native plant community, "roughening" or "gouging" may also be employed. The gouges would be depressions created at the surface with dimensions of approximately 1.5 ft (d) x 3 ft (l) x 3 ft (w).~~
Seeding will mainly occur in the early spring and late fall.

Seeding & Transplanting

Seeding will be accomplished using different methods depending on the area to be seeded. In the more flat areas such as the meadows and existing pasture lands, a typical farmland drill will be used for seeding. In other areas where the surface may be more rough, a modified rangeland drill or "rough terrain seeder" will be used. Finally, in the areas where access is more difficult to reach by heavy equipment due to slope steepness or other limiting factors, broadcast seeding or hydro-seeding will be employed. For a list of plant species to be seeded refer to Tables 3-37 *through* 3-42.

Containerized plants will be planted in those areas proposed for sage-grouse habitat enhancement. These plants will be planted from containers at least 10 cubic inches in size and inoculated with appropriate site-specific or commercial mycorrhizal inocula at specified infection rates. The containerized plants will be planted at a rate that totals at least 400 individuals per acre. For a list of the species to be planted, refer to Table 3-37.

Containerized plants should be dormant when they arrive at the site in the spring or fall and will be planted as soon after delivery as possible. Plants will be planted in a fashion to simulate a natural habitat. If competing vegetation is present at the time of planting, this vegetation will be removed by scalping the area or herbicide application beforehand that provide a time period ample as to not affect the containerized seedling. A small depression will be created in the seedbed around the seedling at the time of planting to increase survivability by harvesting and holding water. The plants will be "watered-in" when they are planted by adding water to the depression. If possible, the plants will be watered during dry periods for the first growing season.

341.230. Mulching Techniques

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished~~ in areas that will be reclaimed to native plant communities (areas~~

~~used for pasture lands will not be mulched).~~ . Mulching will occur by one of the following methods:

- Certified noxious weed free straw applied at a rate of 1 ton/acre anchored by crimping or a chemical binder.
- Wood fiber hydromulch at a rate of ¾ ton per acre for slopes flatter than 3:1 and 1 ton per acre for slopes at 3:1 which is the steepest slope planned at the project. This hydromulch would be anchored with a chemical binder at the manufacturer's suggested rate.

The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. ~~Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.~~

~~Certified weed-free *straw* will be used in those areas where drill seeding has been employed at a rate of 1 ton/acre. The straw will be crimped or otherwise held to the surface by tackifier or plastic mesh stapled to the ground.~~

~~In those areas where broadcast seeding is employed, straw or *hydro-mulch* may be used. In other areas where hydro-seeding is employed, hydro-mulching will also be done. In such cases, seed and mulch will be applied as separate applications, with seeding accomplished first. The mulch will be held to the surface by an effective tackifier that is added to the slurry mix prior to application.~~

~~Finally, in areas that need extra protection due to steepness of slope or where soils are especially erodible, erosion control mat will be utilized. Several excellent materials are available and will be applied at the manufactures recommended rates.~~

Since there is only one post mining land use, mulching will follow one of the above described methods for all reclaim areas.

341.240. Irrigation

Irrigation has not been planned for the reclaimed area with the exception of watering the containerized plants as mentioned above.

341.250. Revegetation Monitoring

Vegetation of the reclaimed areas will be monitored regularly to measure the success of plant establishment and to determine if problem areas exist. Qualitative and quantitative data will be recorded at regular intervals. The qualitative data will include: site location, sample date, observers, slope, exposure, acreage, animal disturbance, erosion damage, dominant plant species observed, and other pertinent notes. Quantitative data recorded will include: total cover (living cover, rock, litter, bare ground), cover by species, composition, frequency, and woody species density.

Methods for quantitative monitoring will be as follows. Transect lines will be placed randomly on each of the revegetation sites. Random sample locations will then be placed from these transect lines and the aforementioned data will be recorded. Ocular methods with square meter quadrat will be used to provide cover and frequency data, whereas, point quarter and/or belt transects will be used to estimate woody species densities.

Weed control through chemical means will follow the current Weed Control Handbook (published annually or biannually by the Utah State University Cooperative Extension Service) and herbicide labels.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbacide, kill or remove the weeds mechanically (roguing, grubbing and mowing).

341.300. Mining, Reclamation & Revegetation Research

Mining, reclamation & revegetation research has been planned and is in the process of being submitted to DOGM. Additionally, DOGM may require greenhouse studies, field trials, or equivalent methods of testing proposed or potential revegetation materials and methods to demonstrate that revegetation is feasible pursuant to R645-300-133.710.

342. **FISH AND WILDLIFE ENHANCEMENT**

This application includes a fish and wildlife plan for the reclamation and postmining phase of the operation consistent with R645-301-330, the performance standards of R645-301-358 and include the following (for details see section 330, OPERATION PLAN).

342.100. Measures for Enhancement of Habitat

Enhancement measures that will be used during the reclamation and postmining phase of the operation to develop aquatic and terrestrial habitat. Such measures may include restoration of streams and other wetlands, retention of ponds and impoundments, establishment of vegetation for wildlife food and cover, and the replacement of perches and nest boxes (see also section 330, **OPERATION PLAN**).

342.200. Reclamation Plants for Enhancement

Where fish and wildlife habitat is to be a postmining land use, the plant species to be used on reclaimed areas have been selected on the basis of the criteria described below.

342.210. Nutritional Values of Plant Species

Among other qualities (e.g. erosion control qualities, establishment capabilities, and seed availability), plant species for revegetation of the Coal Hollow Project have been chosen for their proven nutritional value for wildlife (see Table 3-37 *through* 3-42).

342.220. Cover Quality of Plant Species

Among other qualities (e.g. erosion control qualities, establishment capabilities, and seed availability), plant species for revegetation of the Coal Hollow Project have been chosen for their cover qualities for wildlife (see Table 3-37 *through* 3-42).

342.230. Habitat Enhancement & Plant Species

Among other qualities, plant species for revegetation of the Coal Hollow Project have been chosen for their proven habitat enhancement qualities for wildlife (see Table 3-37 *through* 3-42). The plants have also been chosen for their ability to support and enhance fish or wildlife habitat after the release of performance bonds. At final revegetation, the selected plants will be grouped and distributed in a manner which optimizes edge effect, cover, and other benefits to fish and wildlife.

After consultation with appropriate agencies and biologists regarding habitats and sensitive species, the sage-grouse and its habitat were of greatest concern in the area. There has been a decreasing trend in the populations of this species since 1964 (see **Appendix 3-1** and **Appendix 3-3** for more details). There was a general consensus among the biologists and agencies consulted that due to the: 1) marginal habitat in the Alton Amphitheater area, 2) loss of habitat in recent years for nesting and brood-rearing and 3) relatively low population numbers in the area, that the local population of sage-grouse is vulnerable to elimination, regardless of mining activities proposed by the Coal Hollow Project. Accordingly, the several measures to minimize impacts and enhance habitat for this species have been proposed and are subject to further consideration by the operator and regulatory agencies (see Section 333 above).

342.300. Cropland & Revegetation

Where cropland is to be the postmining land use, where appropriate for wildlife- and crop-management practices, and with approval from the private landowners, the Coal Hollow Project will intersperse the fields with trees, hedges, or fence rows throughout the harvested area to break up large blocks of monoculture and to diversify habitat types for birds and other animals.

342.400. Residential & Industrial Reclamation

Where residential, public service, or industrial uses are to be the postmining land use, and where consistent with the approved postmining land use, the Coal Hollow Project will intersperse reclaimed lands with greenbelts utilizing species of grass, shrubs, and trees useful as food and cover for wildlife. No residential or industrial areas have been planned at this time.

350. PERFORMANCE STANDARDS

351. GENERAL REQUIREMENTS

All coal mining and reclamation operations will be carried out according to plans provided under R645-301-330 *through* R645-301-340.

352. CONTEMPORANEOUS RECLAMATION

Revegetation on all land that is disturbed by coal mining and reclamation operations, will occur as contemporaneously as practicable with mining operations, except when such mining operations are conducted in accordance with a variance for combined Surface and Underground Coal Mining and Reclamation Activities issued under R645-302-280. DOGM may establish schedules that define contemporaneous reclamation.

353. REVEGETATION: GENERAL REQUIREMENTS

Operators of the Coal Hollow Project will establish on re-graded areas and on all other disturbed areas, except water areas and surface areas of roads that are approved as part of the postmining land use, a vegetative cover that is in accordance with the mine permit and reclamation plan.

353.100. Vegetative Plant Cover Qualities

353.110. Diverse, Effective, & Permanent

The vegetation cover established at final reclamation will be diverse, effective and permanent.

353.120. Native Plant Species

The cover will be comprised of species native to the area, or of introduced species where desirable and necessary to achieve the approved postmining land use and approved by the DOGM (see Table 3-37 *through* 3-42).

353.130. Final Vegetation Cover & Quantities

The final cover will be at least equal in extent of cover to the natural vegetation of the area, or those standards set for final revegetation success.

353.140. Vegetation Cover and Soil Stabilization

The cover will be capable of stabilizing the soil surface from erosion.

353.200. The reestablished plant species will also contain the qualities listed below.

353.210. (a) Be compatible with the approved postmining land use.

353.220. (b) Have the same seasonal characteristics of growth as the original vegetation.

353.230. (c) Be capable of self-regeneration and plant succession.

353.240. (d) Be compatible with the plant and animal species of the area.

353.250. (e) Meet the requirements of applicable Utah and federal seed, poisonous and noxious plant; and introduced species laws or regulations.

353.300. Vegetative Cover Exceptions

DOGM may grant exception to the requirements of R645-301-353.220 and R645-301-353.230 when the species are necessary to achieve a quick-growing, temporary, stabilizing cover, and measures to establish permanent vegetation are included in the approved permit and reclamation plan.

353.400. Cropland Exceptions

When the approved postmining land use is cropland, DOGM may grant exceptions to the requirements of R645-301-353.110, R645-301-353.130, R645-301-353.220 and R645-301-353.230.

354. **TIMING OF REVEGETATION**

Disturbed areas will be planted during the first normal period for favorable planting conditions after replacement of the plant-growth medium. The normal period for favorable planting is that planting time generally accepted locally for the type of plant materials selected (see section 341.100, Reclamation Timetable).

355. MULCHING & OTHER SOIL STABILIZING PRACTICES FOR REVEGETATION

Suitable mulch and other soil stabilizing practices will be used on all areas that have been re-graded and covered by topsoil or topsoil substitutes (see section 340, RECLAMATION PLAN).

356. STANDARDS FOR REVEGETATION SUCCESS

356.100. Success Criteria

Success of revegetation will be judged on the effectiveness of the vegetation for the approved postmining land use, the extent of cover compared to the extent of cover of the reference area or other approved success standard, and the general requirements of R645-301-353.

356.110. Vegetation Information Guidelines

Standards for success, statistically valid sampling techniques for measuring success, and approved methods are identified in the DOGM's "Vegetation Information Guidelines, Appendix A." The approved techniques in that document will be used for the Coal Hollow Project.

As stated above, the reclaimed plant communities at the site will be diverse, permanent, capable of stabilizing the soil surface for erosion, and will be compatible with the postmining land use. The reclaimed areas will be compared to the reference areas. Methods to be employed to determine that the standards have been met follow:

Cover Ocular methods by meter square quadrats.

Shrub Density Point quarter method and/or belt transects

Frequency Relative number of times that it occurred in the square meter quadrats.

Production Total annual biomass production will be estimated by clipping, drying and weighing current annual growth. Herbaceous and woody species will be summarized separately. "Double sampling" using four quadrats will be estimated around the clipped plots.

Diversity Diversity will be measured by several methods. The average number of vascular species per meter square quadrat will be obtained by summing the frequency of all species in an area and dividing by 100.

Another diversity measurement will be species richness or simply the total number of species encountered in the quadrats for each area.

Finally, total diversity will be measured by using the MacArthur and Wilson's (1967) formula where the proportion of the sum frequency of each species of an area was calculated. The proportion of each species will be squared and the values for all species in the area are to be summed. This index integrates the number of species encountered and the degree to which frequency of occurrence is equitably distributed among those species. The formula is given below:

$$Total\ Diversity = \frac{1}{\sum P_i^2}$$

where,

P_i = the proportion of the sum frequency for a community contributed by the i^{th} species.

356.120. Revegetation Success Standards

Standards for revegetation success will include comparisons of unmined lands (reference areas) with the areas being reclaimed to evaluate the appropriate vegetation parameters of ground cover, production, or stocking. Ground cover, production, or stocking will be considered equal to the approved success standard when they are not less than 90 percent of the success standard. The sampling techniques for measuring success will use a 90-percent statistical confidence interval (i.e., one-sided test with a 0.10 alpha error).

356.200. Postmining Land Use

Standards for success will be applied in accordance with the approved postmining land uses (see Chapter 4).

356.210. Grazing or Pasture Land

Some areas will be reclaimed as pasture and grazing land (see *Vegetation Map, Drawing 3-1*). For these and other areas determined by the landowners, the ground cover and production of living plants on the revegetated area will be at least equal to that of a reference area or other success standards approved by DOGM.

356.220. Cropland

For areas developed for use as cropland, crop production on the revegetated area will be at least equal to that of a reference area or such other success standards approved by DOGM. The requirements of R645-302-310 through R645-302-317 apply to areas identified as prime farmland (*no areas have been identified as prime farmland in the Coal Hollow Project Area*).

356.230. Wildlife Habitat

Several areas will be returned to wildlife habitat. For these areas success of vegetation will be determined on the basis of tree and shrub stocking and vegetative ground cover (see also section 356.100, Success Criteria).

356.231. Consultation & Approval

Minimum stocking and planting arrangements will be specified by DOGM on the basis of local and regional conditions and after consultation with and approval by Utah agencies responsible for the administration of forestry and wildlife programs. Consultation and approval will be on a permit specific basis.

356.232. Woody Species Success Criteria

Trees and shrubs that will be used in determining the success of stocking and the adequacy of plant arrangement will have utility for the approved postmining land use. At the time of bond release, such trees and shrubs will be healthy, and at least 80 percent will have been in place for at least 60 percent of the applicable minimum period of responsibility. No trees and shrubs in place for less than two growing seasons will be counted in determining stocking adequacy.

356.233. General Vegetative Cover

Vegetative ground cover will not be less than that required to achieve the approved postmining land use.

356.240. Industrial, Commercial or Residential Success Criteria

For areas to be developed for industrial, commercial, or residential use less than two years after regrading is completed, the vegetative ground cover will not be less than that required to control erosion. At this time, no areas have been proposed to be reclaimed as industrial, commercial or residential for the Coal Hollow Project.

356.250. Previous Disturbed Areas Success Criteria

For areas previously disturbed by mining that were not reclaimed to the requirements of R645-200 through R645-203 and R645-301 through R645-302 and that are re-mined or otherwise redisturbed by coal mining and reclamation operations, at a minimum, the vegetative ground cover will be not less than the ground cover existing before redisturbance and will be adequate to control erosion. Other than those lands where the native plant communities have been disturbed for rangeland improvements or pasture lands, no areas would be considered "previously disturbed" in the project area.

356.300. Sediment Control Structures

Siltation structures will be maintained until removal is authorized by the DOGM and the disturbed area has been stabilized and revegetated. In no case will the structure be removed sooner than two years after the last augmented seeding.

356.400. Removal of Sediment Control Structures

When a siltation structure is removed, the land on which the siltation structure was located will be revegetated in accordance with the reclamation plan and R645-301-353 *through* R645-301-357.

357. **REVEGETATION RESPONSIBILITY PERIODS**

357.100. Beginning Date

The period of extended responsibility for successful vegetation will begin after the last year of augmented seeding, fertilization, irrigation, or other work, excluding husbandry practices that are approved by DOGM in accordance with paragraph R645-301-357.300.

357.200. Duration

Vegetation parameters identified in R645-301-356.200 will equal or exceed the approved success standard during the growing seasons for the last two years of the responsibility period. The period of extended responsibility will continue for five or ten years based on precipitation data reported pursuant to R645-301-724.411 based on the following conditions.

357.210. (a). In areas of more than 26.0 inches average annual precipitation, the period of responsibility will continue for a period of not less than five full years.

357.220. (b). In areas of 26.0 inches or less average annual precipitation, the period of responsibility will continue for a period of not less than ten full years.

357.300. Husbandry Practices

357.301. Approval Information

DOGM may approve certain selective husbandry practices without lengthening the extended responsibility period. Practices that may be approved are identified in R645-301-357.310 *through* R645-301-357.365. The operator may propose to use additional practices, but they would need to be approved as part of the Utah Program in accordance with 30 CFR 732.17. Any practices used will first be incorporated into the mining and reclamation plan and approved in writing by DOGM. Approved practices are normal conservation practices for unmined lands within the region which have land uses similar to the approved postmining land use of the disturbed area. Approved practices may continue as part of the postmining land use, but discontinuance of the practices after the end of the bond liability period will not jeopardize permanent revegetation success. Augmented seeding, fertilization, or irrigation will not be approved without extending the period of responsibility for revegetation success and bond liability for the areas affected by said activities and in accordance with R645-301-820.330.

357.302. Demonstration of Appropriate Reclamation Techniques

The Coal Hollow Project will demonstrate that husbandry practices proposed for a reclaimed area are not necessitated by inadequate grading practices, adverse soil conditions, or poor reclamation procedures.

357.303. Bonded Area & Husbandry Practices

DOGM will consider the entire area that is bonded within the same increment, as defined in R645-301-820.110, when calculating the extent of area that may be treated by husbandry practices.

357.304. Separate Responsibility Periods

If it is necessary to seed or plant in excess of the limits set forth under R645-301-357.300, DOGM may allow a separate extended responsibility period for these reseeded or replanted areas in accordance with R645-301-820.330.

357.310. Reestablishing Trees and Shrubs

357.311. Planting Within the Responsibility Period

Trees or shrubs may be replanted or reseeded at a rate of up to a cumulative total of 20% of the required stocking rate through 40% of the extended responsibility period.

357.312. Planting Shrubs in Established Vegetation

If shrubs are to be established by seed in areas of established vegetation, small areas will be scalped (see section 341.220, Planting & Seeding Methods). The number of shrubs to be counted toward the tree and shrub density standard for success from each scalped area will be limited to one.

357.320. Weed Control and Associated Revegetation

Weed control through chemical, mechanical, and biological means discussed in R645-301-357.321 *through* R645-301-357.323 may be conducted through the entire extended responsibility period for noxious weeds and through the first 20% of the responsibility period for other weeds.

Any revegetation necessitated by the following weed control methods will be performed according to the seeding and transplanting parameters set forth in R645-301-357.324.

357.321. Chemical Weed Control

Weed control through chemical means will follow the current Weed Control Handbook (published annually or biannually by the Utah State University Cooperative Extension Service) and herbicide labels.

Weed surveys will also be conducted on the reclaimed areas on a yearly basis or during the revegetation monitoring studies. If undesirable, exotic or "weedy" plant species are present at a density that they could impede revegetation or out-compete desirable plant species, a certified or trained specialist will spray herbacide, kill or remove the weeds mechanically (see below).

357.322. Mechanical Weed Control

Mechanical practices that may be approved include hand roguing, grubbing and mowing.

357.323. Biological Weed Control

Selective grazing by domestic livestock may be used by the Coal Hollow Project. Biological control of weeds through disease, insects, or other biological weed control agents is allowed but will be approved on a case-by-case basis by DOGM, and other appropriate agency or agencies which have the authority to regulate the introduction and/or use of biological control agents.

357.324. Weed Control & Desirable Species Damage

Where weed control practices damage desirable vegetation, areas treated to control weeds may be reseeded or replanted according to the following limitations. Up to a cumulative total of 15% of a reclaimed area may be reseeded or replanted during the first 20% of the extended responsibility period without restarting the responsibility period. After the first 20% of the responsibility period, no more than 3% of the reclaimed area may be reseeded in any single year without restarting the responsibility period, and no continuous reseeded area may be larger than one acre. Furthermore, no seeding will be done after the first 60% of the responsibility period or Phase II bond release, whichever comes first. Any seeding outside these parameters will be considered to be "augmentative seeding," and will restart the extended responsibility period.

357.330. Control of Other Pests

357.331. Big Game

Control of big game (deer, elk, moose, antelope) may be used only during the first 60% of the extended responsibility period or until Phase II bond release, whichever comes first. Any methods used will first be approved by DOGM and, as appropriate, the land management agency and the State of Utah Division of Wildlife Resources (DWR). Methods that may be used include fencing and other barriers, repellents, scaring, shooting, and trapping and relocation. Trapping and special hunts or shooting will be approved by DWR. Other control techniques may be allowed but will be considered on a case-by-case basis by the DOGM and by DWR. Appendix C of the DOGM's "Vegetation Information Guidelines" includes a non-exhaustive list of publications containing big game control methods.

357.332. Small Mammal & Insects

Control of small mammals and insects will be approved on a case-by-case basis by DWR and/or the Utah Department of Agriculture. The recommendations of these agencies will also be approved by the appropriate land management agency or agencies. Small mammal control will be allowed only during the first 60% of the extended responsibility period or until Phase II bond release, whichever comes first. Insect control will be allowed through the entire extended responsibility period if it is determined, through consultation with the Utah Department of Agriculture or Cooperative Extension Service, that a specific practice is being performed on adjacent unmined lands.

357.340. Natural Disasters and Illegal Activities Occurring After Phase II Bond Release

Where necessitated by a natural disaster, excluding climatic variation, or illegal activities, such as vandalism, not caused by any lack of planning, design, or implementation of the mining and reclamation plan on the part of the Coal Hollow Project, the seeding and planting of the entire area which is significantly affected by the disaster or illegal activities will be allowed as an accepted husbandry practice and thus will not restart the extended responsibility period. Appendix C of the Division's "Vegetation Information Guidelines" references publications that show methods used to revegetate damaged land. Examples of natural disasters that may necessitate reseeding which will not restart the extended responsibility period include wildfires, earthquakes, and mass movements originating outside the disturbed area.

357.341. Extent of Area

The extent of the area where seeding and planting will be allowed will be determined by the DOGM in cooperation with the Coal Hollow Project.

357.342. Standards of Success

All applicable revegetation success standards will be achieved on areas reseeded following a disaster, including R645-301-356.232 for areas with a designated postmining land use of forestry or wildlife.

357.343. Seeding & Planting in Phase II Areas

Seeding and planting after natural disasters or illegal activities will only be allowed in areas where Phase II bond release has been granted.

357.350. Irrigation

The irrigation of transplanted trees and shrubs, but not of general areas, is allowed by DOGM through the first 20% of the extended responsibility period. Irrigation may be by such methods as, but not limited to, drip irrigation, hand watering, or sprinkling.

357.360. Highly Erodible Area and Rill and Gully Repair

The repair of highly erodible areas and rills and gullies will not be considered an augmentative practice, and will thus not restart the extended responsibility period, if the affected area as defined in R645-301-357.363 comprises no more than 15% of the disturbed area for the first 20% of the extended responsibility period and if no continuous area to be repaired is larger than one acre.

357.361. Highly Erodible Areas Responsibility Period

After the first 20% of the extended responsibility period but prior to the end of the first 60% of the responsibility period or until Phase II bond release, whichever comes first, highly erodible area and rill and gully repair will be considered augmentative, and will thus restart the responsibility period, if the area to be repaired is greater than 3% of the total disturbed area or if a continuous area is larger than one acre.

357.362. Extent of Area Affected

The extent of the affected area will be determined by the DOGM in cooperation with the Coal Hollow Project.

357.363. Definition of Highly Erodible Areas

The area affected by the repair of highly erodible areas and rills and gullies is defined as any area that is reseeded as a result of the repair. Also included in the affected areas are interspacial areas of thirty feet or less between repaired rills and gullies. Highly erodible areas are those areas which cannot usually be stabilized by ordinary conservation treatments and if left untreated can cause severe erosion or sediment damage.

357.364. Erodible Areas & Sediment Control

The repair and/or treatment of rills and gullies which result from a deficient surface water control or grading plan, as defined by the recurrence of rills and gullies, will be considered an augmentative practice and will thus restart the extended responsibility period.

357.365. Erodible Area Designs & Repairs

The Coal Hollow Project shall demonstrate by specific plans and designs the methods to be used for the treatment of highly erodible areas and rills and gullies. These will be based on a combination of treatments recommended in the Soil Conservation Service Critical Area Planting recommendations, literature recommendations including those found in Appendix C of the Division's "Vegetation Information Guidelines", and other successful practices used at other reclamation sites in the State of Utah. Any treatment practices used will be approved by the Division.

358. PROTECTION OF FISH, WILDLIFE AND RELATED ENVIRONMENTAL VALUES

The Coal Hollow Project will, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts on fish, wildlife, and related environmental values and will achieve enhancement of such resources where practicable.

358.100. Threatened & Endangered Species

A review of the Utah Heritage Program database for sensitive species in the proposed mine site and adjacent areas has been accomplished. Field maps with locations of these species have been prepared and have been used for additional surveys and will continue to be used in future biological studies or when disturbance by mining in specific areas is proposed.

Due to the sensitivity of these species, specific location information is considered confidential and has not been submitted in this application. However, review of this information can be arranged by the regulatory authorities (see section 322.200, Site-Specific Resource Information).

No coal mining and reclamation operation will be conducted which is likely to jeopardize the continued existence of endangered or threatened species listed by the Secretary or which is likely to result in the destruction or adverse modification of designated critical habitats of such species in violation of the Endangered Species Act of 1973. The Coal Hollow Project will promptly report to the DOGM any state- or federally-listed endangered or threatened species within the permit area of which the operator becomes aware. Upon notification, DOGM will consult with appropriate state and federal fish and wildlife agencies and, after consultation, will identify whether, and under what conditions, the operator may proceed.

358.200. Eagles

The coal mining and reclamation operations at the Coal Hollow Project will not be conducted in a manner which would result in the unlawful taking of a bald or golden eagle, its nest, or any of its eggs. The operator of the Coal Hollow Project will promptly report to the DOGM any golden or bald eagle nest within the permit area of which the operator becomes aware. Upon notification, the DOGM will consult with the U.S. Fish and Wildlife Service (USFWS) and DWR and, after consultation, will identify whether, and under what conditions, the mining operations may proceed.

358.300. Removal of a Threatened & Endangered Species

No regulations in the R645 Rules authorizes the taking of an endangered or threatened species or a bald or golden eagle, its nest, or any of its eggs in violation of the Endangered Species Act of 1973 or the Bald Eagle Protection Act, as amended, 16 U.S.C. 668 et seq.

358.400. Riparian & Wetland Areas

There are some riparian and wetland areas associated with springs and seeps in the Coal Hollow permit area (see Chapter 7). At this time, the Coal Hollow Project plans to avoid disturbances to them, enhance them where practicable, and restore, or replace, wetlands and riparian vegetation along rivers and streams if disturbance to them it done.

Additionally, the coal mining and reclamation operations at the Coal Hollow Project will avoid disturbances to, enhance where practicable, or restore, habitats of unusually high value for fish and wildlife (see Section 333, Procedures to Minimize Adverse Impacts to Fish & Wildlife in this document).

358.500. Best Technology Available

The Coal Hollow Project will apply the best technology currently available in all disciplines of the coal mining and reclamation activities.

358.510. Powerline & Transmission Facilities

The Coal Hollow Project will ensure that electric powerlines and other transmission facilities used for, or incidental to, coal mining and reclamation operations on the permit area are designed and constructed to minimize electrocution hazards to raptors, except where DOGM determines that such requirements are unnecessary.

358.520. Fences & Conveyers

The Coal Hollow Project will design fences, overland conveyers, and other potential barriers to permit passage for large mammals, except where the DOGM determines that such requirements are unnecessary.

358.530. Toxic-Forming Areas

The Coal Hollow Project ~~will fence, cover, or use other appropriate methods to exclude wildlife from ponds which~~has no plans for ponds that contain hazardous concentrations of toxic-forming materials.

PHOTOGRAPHS

APPENDIX 3-1

APPENDIX 3-2

APPENDIX 3-3

APPENDIX 3-4

APPENDIX 3-5

413.300. Criteria for Alternative Postmining Land Uses

Other than improvements to the existing land described above, the land will be returned to its pre-mining conditions.

420 AIR QUALITY

421 CLEAN AIR ACT

Coal mining and reclamation operations will be conducted in compliance with the requirements for the Clean Air Act and Any other applicable Utah or Federal statutes and regulations containing air quality standards.

422 UTAH BUREAU OF AIR QUALITY

Alton Coal Development, LLC has retained JBR Environmental Consultants to prepare a Notice of Intent (NOI) for a new source at the Coal Hollow Project. The application has been completed and was submitted on May 8, 2007. JBR coordinated preparation of the original NOI with Tom Bradley and Jon Black of the Utah Division of Air Quality. Upon approval of the NOI, the Executive Secretary of the Utah Air Quality Board will issue an Approval Order for a new source.

423.100- 200 AIR POLLUTION CONTROL PLAN

Production rates at the Coal Hollow Mine are expected to exceed 1,000,000 tons of coal per year. Appendix 4-5 provides a Fugitive Dust Control Plan (FDCP). This plan includes controls and monitoring measures that will be taken to minimize air pollution related specifically to fugitive dust. The revised Notice of Intent provided as Appendix 4-2 provides site specific air dispersion modeling, controls and monitoring for air pollutants not included in the FDCP.

424 PLAN FOR FUGITIVE DUST CONTROL PRACTICES

Proposed mining will exceed 1,000,000 tons annually. A Fugitive Dust Control Plan is provided as Appendix 4-5.

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Deleted: . This document includes sections detailing Best Available Control Technology Analysis, Air Pollution Control Equipment Information, Limitations/Test Procedures and Federal Limitations/Requirements. ¶
¶
The Coal Hollow Mine will utilize the following methods for controlling

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<#>Temporary topsoil and subsoil stockpiles: These piles will be seeded with a temporary seed mix to stabilize soils for protection against wind erosion and dust emissions. ¶
¶
<#>Reclamation: Reclamation surfaces will be revegetated at the earliest, practical opportunity. Seeding of the reclaim are planned to occur in the fall and spring. ACD plans to minimize the active mining surface area exposed at any one time by dividing the project area into small, manageable pits that can be reclaimed concurrently with mining operations. Drawings 5-17 through 5-19 and 5-38 detail the anticipated steps for the reclamation sequence within the project area.¶
¶
Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities (areas used for pasture lands will not be mulched). The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.¶
¶
<#>Roads: All unpaved roads and ... [1]

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Temporary topsoil and subsoil stockpiles: These piles will be seeded with a temporary seed mix to stabilize soils for protection against wind erosion and dust emissions.

Reclamation: Reclamation surfaces will be revegetated at the earliest, practical opportunity. Seeding of the reclaim are planned to occur in the fall and spring. ACD plans to minimize the active mining surface area exposed at any one time by dividing the project area into small, manageable pits that can be reclaimed concurrently with mining operations. Drawings 5-17 through 5-19 and 5-38 detail the anticipated steps for the reclamation sequence within the project area.

Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities (areas used for pasture lands will not be mulched). The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

Roads: All unpaved roads and other unpaved operational areas that are used by mobile equipment shall have water sprayed and/or chemically treated to control fugitive dust emissions. Road surfaces will be graded to stabilize/remove dust-forming debris as required. Areas adjoining primary roads will be stabilized and vegetated as required. Mobile equipment speeds will be controlled to minimize dusting conditions. Speed limits will be posted along all primary haul routes.

Active Pit Areas: Inherent moisture in the overburden and coal will provide significant fugitive dust control in active mining and overburden removal areas. Should emissions from the active areas exceed the limitations described in Appendix 4-2, water will be applied to these areas as necessary to comply with these standards. Cleared vegetation debris within the mine area will be disposed of by placement in pit backfills.

For details related to air quality monitoring and data evaluation refer to Appendix 4-2, Pages 8 through 10.

CHAPTER 5

R645-301-500. ENGINEERING

510. **INTRODUCTION.**

The engineering section of the Mining and Reclamation Plan (MRP) is divided into the operation plan, reclamation plan, design criteria, and performance standards. All of the activities associated with the coal mining and reclamation operations are designed, located, constructed, maintained, and reclaimed in accordance with the operation and reclamation plan.

511. **GENERAL REQUIREMENTS**

511.100 - 511.300. Contents

The operation and reclamation permit application includes descriptions of the coal mining and reclamation operations with attendant Drawings, plans, and cross sections. and its potential impacts to the environment as well as methods and calculations utilized to achieve compliance with design criteria.

All this information can be viewed in this section, Drawings 5-1 through 5-39 and Appendices 5-1 through 5-5.

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512. **CERTIFICATIONS**

512.100. Cross Sections and Drawings.

All cross sections and Drawings required under applicable portions of sections 512.100 through 512.150 have been prepared by, or under the direction of, and certified by: a qualified, registered, professional engineer; a professional geologist; or a qualified, registered, professional land surveyor, with assistance from experts in related fields such as hydrology, geology and landscape architecture.

Compliance with this section has been completed and certifications are available on all cross sections and Drawings.

512.200. Plans and Engineering Designs.

All plans for excess spoil, durable rock fills, coal mine waste, impoundments, primary roads and variances from approximate original contour will be certified by a qualified registered professional engineer.

Plans for excess spoil, sediment impoundments, primary roads, and a variance from approximate original contour have been certified by a qualified registered professional

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engineer. These certifications can be viewed on Drawings 5-22 through 5-37. No coal mine waste or durable rock fills are planned.

512.210 Excess Spoil Disposal Areas

A professional engineer experienced in the design and construction of earth and rock fills will certify the design of Excess Spoil Disposal Areas according to 535.100.

A professional engineer with experience in design and construction of earth and rock fills has certified the design of the Excess Spoil Disposal according to 535.100. An expert in the field of slope stability and geotechnical analysis has provided a thorough review of the design. This analysis can be viewed in Appendix 5-1.

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512.220 - 230 Durable Rock Fills and Coal Mine Waste Structures

The MRP does not contemplate the construction of any permanent Durable Rock Fills or Coal Mine Waste structures. If such structures become part of the plan, a professional engineer experienced in the design of earth and rock fills and or disposal facilities will certify the design according to 535.100 - 536.

512.240. Impoundments.

A professional engineer experienced in the design and construction of impoundments will use current, prudent, engineering practices and will certify the design of the impoundment according to 743.

A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments. The plans have been certified and a detailed geotechnical analysis has been provided. The certifications and drawings can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2.

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512.250. Primary Roads.

A professional engineer will certify the design and construction or reconstruction of primary roads as meeting the requirements of 742.420.

Designs of primary roads have been certified as meeting the requirements of 742.420.

512.260. Variance From Approximate Original Contour.

In areas of the MRP where a variance from the approximate original contour is required, a professional engineer will certify the design for the proposed variance from the approximate original contour, as described under 270, in conformance with professional standards established to assure the stability, drainage and configuration necessary for the intended use of the site.

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A variance from the approximate original contour has been certified in conformance with professional standards to assure the stability, drainage and configuration necessary for the intended use of the site.

513. COMPLIANCE WITH MSHA REGULATIONS AND MSHA APPROVALS.

513.100. Coal Processing Waste Dams and Embankments

The MRP does not contemplate the construction of any coal processing waste dams and embankments.

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513.200. Impoundments and Sedimentation Ponds

No impoundments or sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the proposed Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary, compliance with the requirements of MSHA, 30 CFR 77.216 will be met.

513.300. Disposal of Underground Development Waste, Coal Processing Waste and Excess Spoil in underground mine workings.

The MRP does not contemplate any underground development waste, coal processing waste, or excess spoil being disposed of in underground mine workings.

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513.400. Refuse Piles

The MRP does not contemplate the construction of any refuse piles.

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513.500. Capping, Sealing and Backfilling Openings to the Surface from the Underground.

Each shaft, drift, adit, tunnel, exploratory hole, entryway or other opening to the surface from the underground will be capped, sealed, backfilled or otherwise properly managed consistent with MSHA, 30 CFR 75.1711

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Figure 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface,

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and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

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Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

513.600. Discharges into an underground mine

The MRP does not contemplate discharges into an underground mine.

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513.700. Surface Mining Closer than 500 Feet to an Active Underground Mine

The MRP does not contemplate mining within 500 feet of an active underground mine.

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513.800. Coal Mine Waste Fires

The MRP does not contemplate the generation of any coal mine waste.

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514. INSPECTIONS

All engineering inspections, will be conducted by a qualified registered professional engineer or other qualified professional specialist under the direction of the professional engineer.

514.100 – 140 Excess Spoil.

A professional engineer or specialist experienced in the construction of earth and rock fills will conduct inspections, provide reports certified by a registered professional engineer, and otherwise meet the requirements of R645-301-514.100 through R645-301-514.140

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514.200 - 250. Refuse Piles.

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The MRP does not contemplate the construction of any refuse piles.

514.300. Impoundments.

514.310 - 313. Certified Inspection.

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

514.320. Inspection Standard and Frequency

The MRP does not contemplate construction of any impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216. If such impoundments become necessary, they will be examined in accordance with 30 CFR Sec. 77.216-3. Impoundments not meeting the NRCS Class B or C Criteria for dams in TR-60, or subject to 30 CFR Sec. 77.216, will be examined at least quarterly. A qualified person designated by Alton Coal Development LLC will examine impoundments for the appearance of structural weakness and other hazardous conditions.

515. REPORTING AND EMERGENCY PROCEDURES

515.100. Slides

Any time a slide occurs which may have a potential adverse effect on public, property, health, safety, or the environment, Alton Coal Development LLC will notify the Division by the fastest available means and comply with any remedial measures required by the Division.

515.200. Impoundment Hazards.

If any examination or inspection of an impoundment discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division of the finding and of the emergency procedures formulated for public protection and remedial action. If adequate procedures cannot be formulated or implemented, the Division will be notified immediately.

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515.300. Temporary Cessation

515.312.

During a temporary cessation, surface facilities in areas in which there are no current operations, but in which operations are to be resumed under an approved permit will be effectively secured.

515.320.

Before temporary cessation of coal mining and reclamation operations for a period of 30 days or more, or as soon as it is known that a temporary cessation will extend beyond 30 days, a notice of intention to cease or abandon operations will be submitted to the division. This notice will include:

- A statement of the exact number of acres which have been affected in the permit area prior to such temporary cessation,
- The extent and kind of reclamation of those areas which has been accomplished, and
- Identification of the backfilling, regrading, revegetation, environmental monitoring, and water treatment activities that will continue during the temporary cessation.

516. PREVENTION OF SLIDES

The moderate topography in the area of the planned Coal Hollow Mine will minimize the potential for unplanned slides. A natural barrier will, however, be left undisturbed except as necessary for roads, sedimentation control, temporary topsoil and spoil storage and similar features, beginning at the elevation of the coal seam and extending from the outslope for a distance of at least 50 ft. The barrier will be retained in place to prevent slides and erosion.

520. OPERATION PLAN.

521. GENERAL.

The proposed Coal Hollow Mine is located approximately 2.5 miles south of Alton, Utah. In order to maximize the use and conservation of the coal resource, coal will be recovered using large hydraulic excavators or front end loaders and off-road trucks. Mined coal will be hauled to a central coal area for crushing and placement into a stockpile. Coal from the stockpile will be transferred into a bin and loaded into over the road trucks for transport.

The plan, with Drawings, cross sections, narrative, descriptions, and calculations indicates how the relevant requirements will be met. The lands subject to coal mining and reclamation operations over the estimated life of the operations are identified and briefly described. All appropriate information is located in the subsequent sections and

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Drawings 5-1 through 5-39 and Appendices 5-1 through 5-5. Topsoil piles and removal sequencing is shown on Drawing 2-2.

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521.100. Cross Sections and Drawings.

The application includes cross sections, Drawings and plans showing all the relevant information required by the Division. Appropriate information is provided in Drawings and cross sections 5-1 through 5-39.

521.110. Previously Mined Areas.

Historically, there has been some underground mining of coal within the Alton Amphitheater. The following underground mines are known to have historically existed within the Amphitheater:

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- Seaman Mine
- Smirl Mine
- Alton Mine
- Johnson Mine
- Silver Mine

There are not any known mines that existed or currently exist within the permit area or the adjacent area as defined in R645-100-200. There is also not any active coal mining operations in the area.

521.120. Existing Surface and Subsurface Facilities and Features.

521.121. Buildings

The location of all buildings in and within 1,000 feet of the proposed permit area, with identification of the current use of the buildings is shown on Drawings 1-5 and 1-6.

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521.122. Surface and Subsurface Man-Made Features

The only known surface and subsurface manmade features that exist within the permit area are:

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- County Road 136 (location shown on Drawing 5-3)
- Water pipeline to Pond 20-1 (location shown on Drawing 7-7)

521.123. Public Roads

One public road, Kane County Road 136 is located in or within 100 feet of the proposed permit area and is shown on Drawing 5-3.

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521.124. Existing areas of spoil, waste, coal development waste, and noncoal waste disposal, dams, embankments, other impoundments, and water treatment and air pollution control facilities.

There is one impoundment currently located within the permit area which is Pond 20-1 shown on Drawing 7-7. The area of this impoundment is approximately 3,400 square feet.

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There no other areas of existing spoils, waste, coal development waste, and noncoal waste disposal, dams, embankments, other impoundments, and water treatment and air pollution control facilities within the permit area.

521.125. Ponds and Other Impoundments

The MRP does not contemplate construction of any permanent water impoundments; coal processing waste banks and coal processing waste dams or embankments. The planned location of each sedimentation pond is shown on Drawing 5-3.

521.130. Landowners and Right of Entry and Public Interest Drawings.

All boundaries of lands and the names of present owners of record of both surface and subsurface within the Mine Permit Area are shown on Drawing 1-3 (Surface) and Drawing 1-4 (Subsurface).

521.132. Permit Boundary

The boundaries of land within the proposed permit area are shown on all applicable Drawings.

521.133. Public Roads

No mining or reclamation operations are planned within 100 ft. of a public road. However mine vehicles may cross the right-of-way of Kane County Road #136 for a short period early in the operation's life. Appropriate measures, including signage and mine operating practices and training will be implemented to protect the public.

521.133.2 Relocating a Public Road:

The design of any relocated road will be approved by Kane County authorities, or such other authorities as have jurisdiction. Appropriate measures will be taken to prevent entrance into the mining area via the pre-existing road, and appropriate signage and barriers will be installed to protect the public.

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521.140. Mine Drawings and Permit Area Drawings.

521.141 The boundaries of all areas proposed to be affected over the estimated total life of the coal mining and reclamation operations, with a description of size, sequence and timing of the mining, the coal mining and reclamation operations to be conducted, the lands to be affected throughout the operation, and changes in facilities or features to be caused by the proposed operations;

These items are depicted on Drawings 5-1 through 5-38.

Two options are provided for final reclamation of the permit area. The Preferred option is shown on Drawings 5-35 and 5-36. The anticipated time schedule for this option is shown on Drawing 5-38. This option includes mining operations transitioning into the adjacent federal coal reserves. In the case that these reserves are not acquired by ACD, an alternative plan is provided in Drawing 5-37 and 5-37A which requires rehandling much of the fill above original contour to fill in the final pits. If a circumstance occurs where mining of the permit area is complete but approvals have not been acquired to continue mining in the federal coal reserves; within two years of ceasing operations ACD will then proceed to reclaiming the final pits as specified in the alternative plan.

521.143 The proposed disposal sites for placing excess spoil generated at surface areas affected by surface operations and facilities for the purposes COAL MINING and RECLAMATION ACTIVITIES according to:

- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the proposed excess spoil disposal area are described in Appendix 2-1. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendix. The handling plan can be viewed on Drawing 2-2. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting.

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- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  The MRP does not contemplate alternative postmining land uses.

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- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

  A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-35, 5-36 and 5-17 through 5-19.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-528.310: Excess spoil will be placed in designated disposal areas within the permit area, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.*

  Excess spoil will be placed in the area designated on Drawing 5-3 and 5-35. This fill will be placed in lifts not to exceed 4 feet. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will be sloped to approximately 2% to prevent pooling of water and to reestablish drainage similar to original flow patterns. The excess spoil placed on the non-mined areas is approximately 32

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acres and varies in height from 35 to 110 feet. The area of excess fill over mined out areas (variance from approximate original contour) is an extension of the fill placed on the non-mined area and is approximately 55 acres. Combined acreage of the excess fill placed on mined and non-mined areas is 87 acres and varies in height from 60 to 100 feet above original contour. Total excess fill is 8.6 million yards. Design of this fill can be viewed in Drawings 5-35 through 5-36 and the geotechnical study can be viewed in Appendix 5-1.

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- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the excess spoil structure design has been completed by an expert in this field. The long term static safety factor for this structure design is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. Fill will be covered with subsoil and topsoil as specified in Chapter 2 to provide conditions suitable for revegetation of the area. The geotechnical study can be viewed in Appendix 5-1.

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- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

  No durable rock fills are planned.

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- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The excess spoil as shown in Drawing 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil*

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moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).

The excess spoil as shown in Drawings 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

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- *R645-301-745.100: General Requirements.*

745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

Reclamation of the excess spoil will include topsoil and a subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. In addition, laboratory data for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

The foundation of the excess spoil area also has high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structure.

745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

Permanent impoundments are not planned on the excess spoil area. Small depressions may be constructed as allowed by the Division to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

Laboratory data representative of the overburden planned for disposal in the excess spoil area does not show acid- and toxic forming characteristics.

745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include

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diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil area. The final surface will be regraded to a contour that will route water from snowmelt and rainfall around the excess spoil as shown on the final contours Drawing 5-35. There are no manmade water courses present in the excess spoil area. No underdrains are planned for the excess spoil structure.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil area.

745.122 : Underdrains

No underdrains are planned in the excess spoil area.

745.300: Durable Rock Fills

No durable rock fills are planned in the excess spoil area.

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745.400: Preexisting Benches

Excess spoil will not be disposed of through placement on preexisting benches.

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521.150. Land Surface Configuration Drawings.

Surface contours representing the existing land surface configuration of the proposed permit area are shown on Drawing 5-1 and the post mining land configuration is shown on 5-35. Cross sections with both these landforms are shown on Drawing 5-36.

Deleted: The premining landform, with exception of the Facilities area and Lower Robinson Creek, are from an aerial flight that was limited to a five foot contour interval. Therefore, contours have been interpolated down to a 2 foot level using the available aerial flight information. This interpolation provides accuracy for the Division to make the necessary determinations. The Facilities area and portions of Lower Robinson Creek are actual survey data to the accuracy of 2 foot contours.

521.160. Maps and Cross sections of the Proposed Features for the Proposed Permit Area. These maps and cross sections will clearly show:

521.161 Buildings, utility corridors, and facilities to be used:

These items are shown on Drawings 5-3 through 5-8C.

521.162 The area of land to be affected within the proposed permit area, according to the sequence of mining and reclamation:

A yearly and overall disturbance sequence for the permit area is provided on Drawing 5-2.

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521.163 Each area of land for which a performance bond or other equivalent guarantee will be posted under R645-301-512;

The area of land that will have a performance bond posted is shown on Drawing 5-3.

521.164 Each coal storage, cleaning and loading area. The map will be prepared and certified according to R645-301-512;

These facilities can be viewed on Drawings 5-3 through 5-5.

521.165 Each topsoil, spoil, coal preparation waste, underground development waste, and noncoal waste storage area. The maps will be prepared and certified according to R645-301-512;

Topsoil storage areas and handling can be viewed on Drawing 2-2. Spoil placement and the excess spoil structure can be viewed on Drawings 5-3, 5-17, 5-18, 5-19, 5-35 and 5-36.

521.166 Each source of waste and each waste disposal area relating to coal processing or pollution control;

Only sizing of the coal is proposed. This process will not produce any waste.

521.167 Each explosive storage and handling facility;

Need for these facilities are not anticipated at this time. Should these facilities become necessary, appropriate drawings will be provided to the Division.

521.168 For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, each air pollution collection and control facility; and

There are no specific air pollution collection or control facilities proposed.

521.169 Each proposed coal processing waste bank, dam or embankment. The map will be prepared and certified according to R645-301-512.

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The MRP does not contemplate processing of coal that will produce waste.

521.170. Transportation Facilities Drawings.

Transportation facilities for the Coal Hollow Mine include seven primary roads, a conveyor system, and miscellaneous ancillary/temporary roads. Numerous drawings detail the designs and specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

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- Roads: Two primary mine haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits 1 through 15 (pits shown on Drawing 5-10). This road will be approximately 2,600 feet in length and will be utilized mainly during the first two years of mining. There will be three culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix A5-3. The third culvert is crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

  The second road extends from an intersection with the first road, located just south of the Lower Robinson Creek crossing, and proceeds south to approximately pit 25. This road is approximately 2,500 feet in length and will be used for the south pits 16 through 30. There is one culvert crossing along this road to cross a diversion ditch. This culvert will be a 24 inch culvert sized for maximum anticipated flows in the diversion.

  The following specifications apply to these Primary mine haul roads:
  1) Roads will be approximately 80' in width
  2) Approximately a 2% crown
  3) Approximately one foot deep cut ditches along shoulders for controlling storm water
  4) 18" of crushed rock or gravel for road surfacing
  5) Cut and fill slopes of 1.5 h:1v
  6) Minimum fill over each culvert will be 2 times diameter of culvert
  7) Berms placed as necessary along fills

  The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

  The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

  In addition to the two roads primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

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In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-35 and 5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

- Conveyors: A conveyor system will be used to stockpile coal and to load highway approved haul trucks for transportation to market. The first conveyor is mainly a stacker system for the coal stockpile which will be located at the coal unloading area and will be approximately 451' in length. This conveyor is estimated to be a 48" solid frame system.

  The second conveyor is a coal reclaim belt that will be loaded by an above ground reclaim feeder from the coal stockpile and will convey coal to the loadout chute which will load the highway approved coal haulage trucks. This section will be approximately 290' in length. Similar to the first section, this conveyor is estimated to be a 48" solid frame system.

  Drawings of this system can be viewed on Drawings 5-3 through 5-5.

521.180. Support facilities.

Description of the support facilities is provided in Section 526.220. Drawings 5-3, 5-4, 5-5, 5-6, 5-7, 5-8, 5-8A, 5-8B, and 5-8C provide the maps, appropriate cross sections, design drawings and specifications to demonstrate compliance with R645-301-526.220 through R645-301-526.222 for each facility.

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Deleted: The mine support facilities will include an office, shop, wash bay, oil containment, fuel containment, coal stacking system, and a coal loadout system. These facilities will be constructed on an isolated section of the permit area that is approximately 29 acres. This area is located immediately north of Lower Robinson Creek, in Township 39 South, Range 5 West, Section 19. A diversion ditch will route water from the upgradient area immediately east of the area around the facilities area and into a tributary of Lower Robinson Creek as shown on Drawing 5-3. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. Details for this impoundment can be viewed on Drawing 5-28.¶
The following is a detailed description of each proposed facility and a reference to where detailed drawings can be found: ¶
<#>Office: The office will be located on the northwest corner of the facilities area, immediately adjacent to the facilities access road. This building will be a steel structure with concrete footers. This structure will be 150 feet long by 100 feet wide and will be two stories in height. The office will provide working space for administrative and technical personnel. Details for the office can be viewed on Drawings 5-3 and 5-6. ¶
<#>Shop: The shop will be located on the northeast side of the facilities area. This building will be a steel structure with concrete floors and foundation. The structure will be approximately 200 feet long by 100 feet wide and 50 feet high. This building will be used for maintenance of equipment, parts storage, tool storage, and office space for maintenance personnel. Details for this building can be viewed on Drawings 5-3 and 5-7.¶
<#>Wash Bay: The wash bay will be located immediately east of the shop. This building will be a steel structure with a concrete foundation. The structure will be 50 feet long by 60 feet wide and 50 feet high. Included will be a cl ... [1]

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521.200. Signs and Markers Specifications.

Signs and markers will be posted, maintained, and removed by Alton Coal Development LLC. Signs and markers will be a uniform design that can be easily seen and read; made of durable material; conform to local laws and regulations, and be maintained during all activities to which they pertain;

521.240. Mine and Permit Identification Signs.

Identification signs showing the name, business address, and telephone number of Alton Coal Development LLC and the identification number of the permanent program permit authorizing coal mining and reclamation operations will be displayed at each point of access to the permit area from public roads, and will be retained and maintained until after the release of all bonds for the permit area;

521.250. Perimeter Markers.

The perimeter of a permit area will be clearly marked before the beginning of surface mining activities;

521.260. Buffer Zone Markers.

Buffer zones will be marked along their boundaries as required under 731.600

521.270. Topsoil Markers.

Markers will be erected to mark where topsoil or other vegetation - supporting material is physically segregated and stockpiled.

522. **COAL RECOVERY**.

The MRP is designed to maximize recovery of the coal resource within technological, safety and legal limitations. Coal will be recovered from the Smirl Seam which ranges in thickness from 13.5 to 18.5 feet averaging approximately 16 feet in the planned mining area. The Smirl Seam is the only surface mineable seam in the permit area. Isopach maps of the coal thickness and strip ratio can be viewed on Drawings 5-13 and 5-14

Some coal along the boundaries of the mine area will not be recovered in conjunction with the proposed operation. This includes coal underlying the pit highwalls and areas where drainage or sedimentation control structures (diversions, ditches, ponds, etc) are located. The mine is designed to minimize such losses by locating haulage ramps in the spoil rather than on the pit wall, by oversteepening the coal face at the pit edges, and by minimizing the use of out of pit ancillary roads. Coal which is left in place in these areas may be recovered in the future when adjacent property rights are secured. Current plans are for a planned maximum mining depth of approximately 200 ft. and a strip ratio of 10:1; however, the ultimate mining depth will depend on cost related factors.

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A detailed mine plan has been developed for the proposed permit area and the following table along with Drawing 5-9 summarize the coal extraction for the permit area:

Description	Extraction Status	Average Coal Thickness (ft)	Average Strip Ratio* (yd^3/Ton)	Quantity (**Ton)
Total Coal within Permit Boundary	N/A	16.3	7.7	9,159,000
High Strip Ratio Area (NE corner of permit area)	Not Mined	16.5	13.5	2,764,000
Coal under highwalls and sedimentation structures	Not Mined	17.2	4.8	1,207,000
Coal under Robinson Creek Diversion	Not Mined	15.5	3.9	172,000
Recoverable Coal	Mined	16.3	6.4	5,016,000

*All strip ratios are bank cubic yards of overburden to tons of coal
**All coal tons are based on a 95% recovery factor

The application of highly flexible, open pit truck/shovel techniques will minimize losses of coal due to pit geometry or spoil support requirements, allowing the maximum possible exposure of the coal resource. The full seam section will be loaded primarily using large hydraulic backhoes. The backhoes, which can work from the top of the seam, provide the ability to efficiently and cleanly excavate the lower part of the coal seam without disturbing the pit floor. This, along with the machine's high degree of bucket horizon control will minimize floor losses. The backhoes can also work safely from the top of the seam to oversteepen the loading face along the pit walls, thus recovering the maximum amount of coal.

Where pit geometry or operational factors preclude the use of backhoes for loading, a large rubber tire front end loader will be used. These machines provide similar horizon control, can operate on the floor of the pit or on an intermediate bench, and can recover coal from confined areas such as the ends of the pits.

Rear dump haul trucks, loaded by the backhoes or front end loader, will be used to move the coal from the pit via inpit roads and the primary haulroad to the crusher and stockpile. The trucks will be equipped with "combo" beds suitable for hauling both coal and overburden, and configured to minimize coal spillage.

A net recovery of 95% (including the effects of in-pit coal losses and out-of-seam dilution) of the coal exposed in the pit is anticipated. Normal coal losses are expected due to cleaning of the top of the seam, loading losses at the seam floor, and coal oxidation near the outcrop.

No coal washing is contemplated at this time, thus there will be no coal processing losses.

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Maps and cross sections providing detailed information related to coal recovery activities can be viewed on Drawings 5-9 through 5-14.

523. **MINING METHOD(s).**

The Coal Hollow Mine will be a surface coal mining operation using open pit mining methods to produce up to 2 million tons of coal per year. Primary mining equipment will include hydraulic excavators and end-dump mining trucks. The coal will be crushed at the mine site, and hauled to market in over-the-road coal trucks.

The mine is planned to produce approximately 5.02 million tons of coal over a life of approximately 3 years. The estimated production schedule is summarized below:

Year		Tons Produced (000)
1		2,000
2		2,000
3		1,016
Total		5,016

Initial mine development will involve removal and storage of topsoil from mine infrastructure locations. Facilities for equipment maintenance/warehouse, coal handling, and offices will be constructed. During the development and initial mining period, facilities temporary in nature may be used until permanent facilities can be built. Construction of sedimentation ponds, diversion ditches, and mine roads accessing the initial mining areas will also be ongoing.

Mining will employ typical open pit methods using truck/loader type equipment to remove overburden and recover the coal. Mining will advance across the property in successive cuts approximately 250 ft. in width and 800 to 1,300 ft. long (generally equal to the width of the property less property barriers). Layout of these pits can be viewed on Drawing 5-10. The overburden will be removed in layers or lifts approximately 20 to 40 feet deep. In practice, these overburden lifts are mined in a stairstep fashion ahead of the coal removal operation to provide adequate working room for the equipment and stable advancing slopes. Once mining is complete, excavated overburden (spoil) from a successive cut is used to backfill the excavation. General cross sections of this process can be viewed on Drawings 5-11 and 5-12.

Prior to beginning mining, the area will be cleared of vegetation, and the topsoil will be recovered and either stockpiled or live hauled to regraded areas. It is not anticipated that blasting of the overburden will be necessary based on drilling data. Should this process become necessary, this is the phase where it would be implemented. Overburden will then be removed using large hydraulic excavator(s) or front end loaders and off-road trucks which will haul the spoil and place it in parts of the pit where the coal has been removed, or in the excess spoil area shown on Drawings 5-3, 5-35 and 5-36. Overburden

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is removed in successively deeper benches until the coal seam is exposed. Some overburden in lower lifts may be moved by direct dozing into the mined out pit by large bulldozers.

When overburden removal is finished in a particular pit, the top of the coal will be cleaned (removal of any roof rock or other non-coal material on top of the seam) using a motor grader, dozer or front end loader. The material removed will be placed in the adjacent mined out pit. If necessary, the coal seam will be loosened by drilling and blasting or ripping prior to loading. Drilling and blasting of the coal is not expected to be necessary. The cleaned, exposed coal is then excavated by backhoe or front end loader and placed into off-road rear dump trucks.

Once the coal is removed, the pit will be backfilled by spoil from adjacent mine pits. Spoil will be placed in lifts and spread with a dozer. Once the pit is backfilled to the planned final surface contour, suitable topsoil and subsoil will be replaced, and the area reseeded. Revegetation work will proceed seasonally as appropriate for planting.

Overburden excavation and coal mining at Coal Hollow will begin near the subcrop of the coal seam at the western end of the permit area in the NW ¼ NE ¼ of Section 30, T39S, R5W. Topsoil will be removed and stored separately in topsoil stockpiles as shown on Map 2-2. Overburden from the initial pits will be hauled to the excess spoil pile east of the mining area. Once the initial pits are established, as much spoil as possible will be placed directly in the pit backfill, allowing reclamation to closely follow mining. This initial phase includes pits 1 through 8 as shown on Drawing 5-10. The mining and reclamation process for this phase can be viewed on Drawing 5-17.

From the initial mining area, operations will proceed eastward through the NE ¼ of Section 30 to the NW ¼ of Section 29 (as shown on Drawing 5-10). The mining and reclamation process for this phase can be viewed on Drawing 5-18. The pit will then turn south, and advance to the north edge of Section 31 T39S, R5W. This mining and reclamation phase can be viewed on Drawing 5-19. As shown on Drawing 5-19, the final pits will not be backfilled at this stage. The proposed method for filling these pits back to approximate original contour will be accomplished by utilizing overburden from the pit(s) in the adjacent federal reserves located immediately west of this area. Alton Coal Development, LLC is currently in the process of an Environmental Impact Study for these reserves with the intent of acquiring the rights to mine. It is expected that these rights will be acquired prior to the completion of the final phase in the proposed Permit Area. The final landform for the Permit Area is shown on Drawings 5-35 and 5-36.

In the case that Alton Coal Development, LLC is not successful with acquiring the rights to the adjacent federal coal reserves, spoil will be rehandled from the excess spoil and variance from the approximate original contour to fill the remaining pits. The final landform for this alternate scenario is shown on Drawing 5-37 and 5-37A.

An estimate of the primary mining equipment planned for use at the Coal Hollow Mine is listed below:

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Diesel - Hydraulic Excavators (15 to 38 cu. yd. capacity).
Rubber Tired Front End Loaders (8 to 20 cu. yd. capacity)
End Dump Trucks (100 to 240 ton capacity class)
Track Dozers (Caterpillar D7 through D11 Class)
Motor Graders (Caterpillar 16H to 24H Class)
Water Trucks (8,000 to 20,000 Gallon Class)

A variety of other equipment will also be used to support the mining operation.

Proposed engineering techniques for meeting the proposed mining methods will include:

- Design support for roads, pits, sediment impoundments etc…
- Field staking of designs utilizing high precision GPS survey systems.
- Weekly field engineering support to view and provide guidance related to designs and environmental controls.
- Ongoing geotechnical support for ensuring highwall stability
- As additional information becomes available, update geological models to ensure full recovery of resource.
- Weekly mine plans that specify appropriate engineering and environmental specifications.

There are no known underground mines within 500 feet of the permit boundary; therefore, no surface mining or reclamation activities will take place within 500 feet of any underground mine.

524. BLASTING AND EXPLOSIVES

As a result of the 2005 drilling program and overburden characterization, it was determined that the soil over the coal seam is void of any solid structure and that the overburden is extremely homogenous consisting of soft clay and soft shale. As results of this cursory investigation, it is anticipated that there would be no need to drill and blast the overburden to facilitate the removal of the spoil above the coal seam. Also, due to the fact that the coal will have to be mined from on top of the seam due to wet clay zone beneath the coal seam it is anticipated that there would be no need to drill and blast the coal seam to facilitate coal removal.

As a safeguard or fallback position if mining condition should change, all blasting and explosive criteria will be addressed.

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Though not anticipated, explosives may be utilized as necessary at Coal Hollow Mine to break the overburden over the coal and may be used to break the coal for loading if necessary. In accordance with the requirements of this section, a blasting plan is provided to the Division in Appendix 5-4. Blasts that use more than five pounds of explosives or blasting agents will be conducted according to the schedule provided in 524.400.

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524.100 Blaster Certification

Alton Coal Development, LLC (ACD) will, prior to conducting any surface blasting operations, ensure that all surface blasting incident to surface mining in Utah is conducted under the direction of a Utah Certified Blaster. Certificates of blaster certification will be carried by the blasters or will be on file at the mine permit area during blasting operations. A blaster and at least one other person will be present at the firing of a blast.

Persons responsible for blasting operations at a blasting site will be familiar with the blasting plan and site-specific performance standards and give on-the-job training to persons who are not certified and who are assigned to the blasting crew or assist in the use of explosives.

524.200 Blast Design

There are no dwellings, public buildings, schools, churches, or community or institutional building within 1,000 feet of the planned blasting area in the initial (year 1) mining period. There are also no underground mines within 500 feet of the permit. The anticipated blast design can not be reasonably estimated at this time since ACD is not sure what geologic conditions exist that may require blasting. If conditions are encountered that require blasting, ACD will provide the Division with the designed pattern prior to conducting blasting.

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Blasts conducted within 1000 ft. of a dwelling, public building, school, church, or community or institutional building will be submitted for Division and MSHA approval, prior to blasting. The blast design will contain sketches of the drill and delay patterns, decking, type and amount of explosives required per blast, critical dimensions, design factors utilized to protect the public, general location drawings of protected structures, which meet the applicable airblast, flyrock, and ground vibration standards in 524.600.

The blast design will be prepared and signed by a Utah certified blaster.

524.300 - 350 Preblasting Survey

A preblasting survey will be conducted prior to commencement of blasting operations. As part of the preblasting survey Alton Coal Development LLC will:

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- Notify, in writing, all residents or owners of dwellings or other structures located within one-half mile of the permit area how to request a preblasting survey at least 30 days before initiation of blasting.
- Prepare a written report of any preblasting survey. A resident or owner of a dwelling or structure within one-half mile of any part of the permit area may request a preblasting survey. This request will be made, in writing, directly to Alton Coal Development LLC or to the Division, who will promptly notify Alton Coal Development LLC. Alton Coal Development LLC will promptly conduct a

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preblasting survey of the dwelling or structure and promptly prepare the written report. An updated survey of any additions, modifications, or renovation will be performed by Alton Coal Development LLC if requested by the resident or owner.

- Determine the condition of the dwelling or structure and will document any preblasting damage and other physical factors that could reasonably be affected by the blasting. Structures such as pipelines, cables, transmission lines, and cisterns, wells, and other water systems warrant special attention; however, the assessment of these structures may be limited to surface conditions and other readily available data.
- Require the written report of the survey be signed by the person who conducted the survey. Copies of the report will be promptly provided to the Division and to the person requesting the survey. If the person requesting the survey disagrees with the contents and/or recommendations contained therein, he or she may submit to both Alton Coal Development LLC and the Division a detailed description of the specific areas of disagreement.
- Complete any survey requested more than ten days before the planned initiation of blasting, before blasting occurs.

524.400 Blasting Schedule

524.420. Timing of Blasting

All blasting will be conducted between sunrise and sunset unless nighttime blasting is approved by the Division. Alton Coal Development LLC will conduct blasting operations at times approved by the Division and announced in the blasting schedule.

524.410. Unscheduled Blasts

Unscheduled blasts will be conducted only where public or operator health and safety so requires and for emergency blasting actions. When an unscheduled surface blast incidental to coal mining and reclamation operations is conducted, Alton Coal Development LLC, using audible signals, will notify residents within one-half mile of the blasting site and document the reason in accordance with 524.760.

524.450 - 453. Blasting Schedule Publication and Distribution.

Alton Coal Development LLC will:

- Publish the blasting schedule in a newspaper of general circulation in the locality of the blasting site at least ten days, but not more than 30 days, before beginning a blasting program;

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- Distribute copies of the schedule to local governments and public utilities and to each local residence within one-half mile of the proposed blasting site described in the schedule; and
- Republish and redistribute the schedule at least every 12 months and revise and republish the schedule at least ten days, but not more than 30 days, before blasting whenever the area covered by the schedule changes or actual time periods for blasting significantly differ from the prior announcement; and

524.460 - 465. Blasting Schedule Contents.

The blasting schedule will contain, at a minimum:

- Name, address, and telephone number of operator;
- Identification of the specific areas in which blasting will take place;
- Dates and time periods when explosives are to be detonated;
- Methods to be used to control access to the blasting area; and
- Type and patterns of audible warning and all-clear signals to be used before and after blasting.

524.500 - 532 Blasting and Warning Signs, Access Control

Blasting signs will read **"Blasting Area"** and be conspicuously placed along the edge of any blasting area that comes within 100 feet of any public right-of-way, and at the point where any other road provides access to the blasting area. At all entrances to the mine permit area from public roads or highways, signs will be conspicuously placed which read **"Warning! Explosives in Use"**, clearly list and describe the meaning of the audible blast warning and all-clear signals in use, and explain the identification of blasting areas where charged holes await firing at the blasting site in the mine permit area.

Warning and all-clear signals of different character or pattern that are audible within a range of one-half mile from the point of the blast will be given. Each person within the permit area and each person who resides or works regularly within one-half mile of the blast site in the mine permit area will be notified of the meaning of the signals in the blasting schedule and notification.

Access within the blasting areas will be controlled to prevent presence of livestock or unauthorized persons during blasting and until an authorized representative of Alton Coal Development LLC has reasonably determined that no unusual hazards exist, such as imminent slides or un-detonated charges; and access to and travel within the blasting area can be safely resumed.

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524.600 - 610 Adverse Effects Of Blasting

Blasting will be conducted to prevent injury to persons, damage to public or private property outside the mine permit area, and changes in the course, channels, or availability of surface or ground water outside the mine permit area.

524.620 Airblast Limits

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Airblast will not exceed the maximum limits listed below at the location of any dwelling, public building, school, church, or community or institutional building outside the mine permit area, except for those structures and facilities owned by Alton Coal Development LLC as approved by the Division. Maximum airblast limits are as follows:

Lower Frequency Limit of Measuring System, HZ (+3dB)		Maximum Level dB
0.1 Hz or lower – flat response (1)		134 peak
2 Hz or lower – flat response		133 peak
6 Hz or lower – flat response		129 peak
C-weighed – slow response (1)		105 peak dBC

(1) Only when approved by the Division.

524.630. Monitoring:

Periodic monitoring will be conducted to ensure compliance with the airblast standards. Airblast measurements and will be taken as required by the Division at locations specified by the Division. The measuring system used will have an upper-end flat frequency response of at least 200 Hz.

524.633. Flyrock:

Flyrock traveling in the air or along the ground will not be cast from the blasting site more than one-half the distance to the nearest dwelling or other occupied structure; beyond the area of blasting access control or beyond the mine permit area boundary.

524.640 - 662. Ground Vibration.

In all blasting operations, except as otherwise authorized by the Division, the maximum ground vibration will not exceed the values approved by the Division. The maximum ground vibration for protected structures will be in accordance with either the maximum peak-particle velocity limits, the scaled-distance equation, the blasting-level chart, or by the Division. All other structures in the vicinity of the blasting area such as water towers, pipelines and other utilities, tunnels, dams, impoundments, and underground mines will be protected from damage by establishment of a maximum allowable limit on the ground vibration. These limits will be submitted by Alton Coal Development LLC and approved by the Division prior to blasting. A seismographic record will be provided for each blast.

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Maximum Peak-Particle Velocity Method: The maximum ground vibration will not exceed the following limits at the location of any dwelling, public building, school, church, or community or institutional building outside the mine permit area in accordance with the following:

Distance (D) from Blast Site in feet	Maximum allowable Particle Velocity (Vmax) for ground vibration, in inches/second (1)	Scaled distance factor to be applied without seismic monitoring (Ds) (2)
0 to 300	1.25	50
301 to 5,000	1.00	55
5,001 and beyond	0.75	65

(1) Ground vibration will be measured as the particle velocity. Particle velocity will be recorded in three mutually perpendicular directions. The maximum allowable peak particle velocity will apply to each of the three measurements.
(2) Applicable in the scale-distance equation of 524.651.

Scaled Distance Equation Method: Alton Coal Development LLC will use the scaled-distance equation, $W=(D/Ds)^2$, to determine the allowable charge weight of explosives to be detonated in any eight-millisecond period, without seismic monitoring: where W = the maximum weight of explosives, in pounds: D = the distance, in feet, from the blasting site to the nearest protected structure: and Ds = the scaled-distance factor, which may initially be approved by the Division using the values for scaled-distance factor listed in 524.642.

The development of a modified scaled-distance factor may be authorized by the Division on receipt of a written request by Alton Coal Development LLC, supported by seismographic records of blasting at the mine site. The modified scaled-distance factor of the predicted ground vibration will not exceed the prescribed maximum allowable peak particle velocity of 524.642 at a 95% confidence level.

Blasting-Level-Chart. Alton Coal Development LLC may use the ground-vibration limits in Figure 1 (Figure 1, showing maximum allowable ground particle velocity at specified frequencies, is incorporated by reference. Figure 1 may be viewed at 30 CFR 817.67 or at the Division of Oil, Gas and Mining State Office.) to determine the maximum allowable ground vibration. If the Figure 1 limits are used, a seismographic record including both particle velocity and vibration-frequency levels will be provided for each blast. The method for the analysis of the predominant frequency contained in the blasting records will be approved by the Division before application of this alternative blasting criterion.

524.690. Standards not Applicable

The maximum airblast and ground-vibration standards of 524.620 through 524.632 and 524.640 through 524.680 will not apply at the following locations: At structures owned by Alton Coal Development LLC and not leased to another person; and at structures

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owned by Alton Coal Development LLC and leased to another person, if a written waiver by the lessee is submitted to the Division before blasting.

524.700 Records of Blasting Operations:

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Blasting records will be maintained at the mine site for at least three years and upon request, records will be available for inspection by the Division or the public. A blasting record will contain the name of Alton Coal Development LLC; location, date, and time of the blast; name, signature, and Utah certification number of the blaster conducting the blast. It will also include the identification, direction, and distance, in feet, from the nearest blast hole to the nearest dwelling, public building, school, church, community or institutional building outside the permit area, except those described in 524.690 and weather conditions, including those which may cause possible adverse blasting effects.

The blasting record will include: The type of material blasted; sketches of the blast pattern including number of holes, burden, spacing, decks, and delay pattern; diameter and depth of holes; types of explosives used; total weight of explosives detonated in an eight-millisecond period; initiation system; type and length of stemming; and mats or other protection used.

If required, a record of seismographic and airblast information will include: type of instrument, sensitivity, and calibration signal or certification of annual calibration; exact location of instrument and the date, time, and distance from the blast; name of the person and firm analyzing the seismographic record; and the vibration and/or airblast level recorded; and the reasons and conditions for each unscheduled blast.

524.800 Use of Explosives:

Alton Coal Development LLC will comply with all appropriate Utah and federal laws and regulations in the use of explosives.

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Not applicable

526. **MINE FACILITIES**:

526.110-115 Existing Structures.

There are no existing structures within the permit area.

526.116. Public Roads:

526.116.1. Operations Within 100 ft. of a Public Road

Initial mining operations at the Coal Hollow Mine will be on the western edge of the property, and will require rerouting Kane County Road #136 so that operations do not come within 100 feet of this road. During the initial development phase (topsoil removal, diversion construction, etc..), equipment traffic may cross the county road right-

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of-way to access the necessary area. see Drawing 5-3. Details related to the road relocation can be viewed on Drawing 5-3 and in Appendix 1-7.

526.116.2 Relocating a Public Road:

Following the initial development period, Kane County will temporarily relocate County Road #136 (K3900) to federal lands located west of the permit area which are managed by the BLM. This relocation will bypass the permit area for the duration of mining operations and is shown on Drawing 5-3. Details of agreements and appropriate approvals for this road relocation are located in Appendix 1-7. The relocated road is not within 100 ft. of mining or reclamation operations. The design and route of the relocated road has been approved by Kane County authorities and the BLM. Kane County will continue to have sole jurisdiction and will maintain it as a public road. Following completion of mining operations within the permit area, Kane County will reestablish the road to the approximate original location and will also reclaim the temporary road as required by the BLM. The existing road from the north relocation diversion point to the permit boundary will also continue to be maintained as a public road by Kane County. Once the road intersects the permit boundary, appropriate signs and barricades will be installed to protect the public.

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526.200 Utility Installation and Support Facilities

526.210 Existing Utilities.

There are no known oil, gas, and water wells; oil, gas, and coal-slurry pipelines, railroads; electric and telephone lines; and water and sewage lines passing over, under, or through the permit area. Should such facilities be installed, mining and reclamation operations will be conducted in a manner that minimizes damage, destruction, or disruption of services provided by such facilities unless otherwise approved by the owner of those facilities and the Division.

526.220 Support Facilities

The mine support facilities will include an office, shop, wash bay, oil containment, fuel containment, coal stacking system, coal loadout system and an equipment parking area These facilities will be constructed on an isolated section of the permit area that is approximately 34 acres. This area is located immediately north of Lower Robinson Creek, in Township 39 South, Range 5 West, Section 19. A diversion ditch will route water from the upgradient area immediately east of the area around the facilities and into a tributary of Lower Robinson Creek as shown on Drawing 5-3. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. In addition to this pond, an additional small impoundment will also be located in the southwest corner of the

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facilities area to control drainage from the mine access road. Details for these impoundments can be viewed on Drawings 5-28 and 5-28B.

The following is a detailed description of each proposed facility and a reference to where detailed drawings can be found:

- Office: The office will be located on the northwest corner of the facilities area, immediately adjacent to the facilities access road. This building will be a steel structure with concrete footers. This structure will be 150 feet long by 100 feet wide and will be two stories in height. The office will provide working space for administrative and technical personnel. Details for the office can be viewed of Drawings 5-3 and 5-6.
- Shop: The shop will be located on the northeast side of the facilities area. This building will be a steel structure with concrete floors and foundation. The structure will be approximately 200 feet long by 100 feet wide and 50 feet high. This building will be used for maintenance of equipment, parts storage, tool storage, and office space for maintenance personnel. Details for this building can be viewed on Drawings 5-3 and 5-7.
- Wash Bay: The wash bay will be located immediately east of the shop. This building will be a steel structure with a concrete foundation. The structure will be 50 feet long by 60 feet wide and 50 feet high. Included will be a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment. Details for this structure can be viewed on Drawings 5-3, 5-8, and 5-8A.
- Oil and Fuel Containments: The oil and fuel containments will be concrete structures appropriately sized for containing metal tanks. The oil containment will contain 55 gallon barrels and up to 2,000 gallon totes. This containment will be 80 feet long by 30 feet wide and 3 feet deep. The fuel containment will store 3 fuel tanks. Included will be a 4,000 gallon unleaded fuel tank and two 12,000 gallon diesel tanks. This structure will 50 feet long by 30 feet wide and 3 feet deep. Details for this structure can be viewed on Drawings 5-3 and 5-8.
- Coal Stacking System: The coal stacking system will be located in the central part of the facilities area. This system will include a coal hopper, coal feeder breaker, feed conveyor, crusher, and an inclined conveyor belt. Trucks will dump coal into the coal hopper which will funnel coal through the feeder breaker onto a short feed conveyor belt. This conveyor belt will transport the coal approximately 195 feet to a crusher that will size the coal appropriately for market. Once the coal is sized through the crusher it will enter an inclined stacker conveyor belt that is angled at approximately 16 degrees and is 186 feet long. This system will be a radial conveyor which will feed a coal stock pile with a live storage of approximately 50,000 tons. This system can be viewed on Drawings 5-3 through 5-5.
- Coal Loadout System: The coal loadout system will be located in the central part of the facilities area. This system will include an above ground reclaim feeder, a coal reclaim conveyor and an inclined conveyor. The reclaim feeder will be loaded by a dozer pushing the coal onto the feeder. One inclined conveyor that is approximately

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290 feet in length will convey the coal from the feeder to the loadout hopper. This loadout hopper will load highway approved haul trucks that transport coal to market.

- Minor Facilities: The minor facilities will include a septic vault at the office (Drawing 5-6), a power washing and water recycle system in the Wash Bay (Drawing 5-8A), conduit with electrical lines running from generators to various facilities (Drawing 5-8B), Water System (Drawing 5-8C), an Equipment Hotstart Area (Drawing 5-3, 5-8B) and a Field Hydrant (Drawing 5-4, 5-5, 5-8B).
- Electrical System: The electrical system for the facilities at Coal Hollow will consist of two diesel fuel powered generators. One generator is a 750 KVA unit that will provide electricity to all the buildings. The other generator is a 1200 KVA unit that will be used to supply electricity to the coal conveying, sizing, stockpiling and loading system. The anticipated layout of the electrical system is shown on Drawing 5-8B.
- Dust Control Structures: A water system will be constructed to provide water for non-potable uses at the facilities and also for fugitive dust control measures. This system will consist of a water well, 6" water transport pipe, and two 16,000 gallon water tanks. The first water tank will be placed near the mining area and will be used specifically to load the water truck which will spray water on the active roads within the permit area to control dust. The second tank is located at the facilities area to provide a water supply to the facilities for non-potable uses (cleaning equipment, restrooms, etc…). Further details related to this water system can be viewed on Drawing 5-8C.

During mine development and the initial mining period, some facilities of a temporary nature such as mobile buildings and crusher/stacking conveyors may be utilized.

Support facilities to provide lighting at night will be kept to a minimum but will need to be sufficient enough to provide safe operating conditions in the dark. The following lighting equipment is anticipated to be used to provide safe working conditions:

- Two to three mobile light plants: Each light plant will have up to four 1,000 watt lights.
- Four to six exterior lights at the facilities area for lighting walkways and miscellaneous work areas: Each of these is expected to be 250 watt lights.
- Lights on mobile mining equipment, support vehicles and building lights

The support facilities will be located, maintained, and used in a manner that prevent or control erosion and siltation, water pollution, and damage to public or private property; and to the extent possible use the best technology currently available to minimize damage to fish, wildlife, and related environmental values; and minimize additional contributions of suspended solids to stream flow or runoff outside the mine permit area. Any such contributions will not be in excess of limitations of Utah or Federal law.

The facilities will be fully reclaimed at the end of mining operations with the exception of the water well. The final contour for this area can be viewed on Drawing 5-35 and 5-37 and an anticipated timetable is shown on Drawing 5-38.

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526.300 Water Pollution Control Facilities:

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Water pollution associated with mining and reclamation activities within the permit areas will be controlled by:

- Construction of berms and/or diversion ditches to control runoff from all facilities areas.
- Roads will be constructed with ditches to capture runoff
- Diversion ditches will be constructed as necessary around active mining and reclamation areas to capture runoff from those areas.
- Sedimentation impoundments will be constructed to control discharges
- In areas where impoundments or diversions are not suitable to the surrounding terrain, silt fence or other appropriate structures will be utilized to control sediment discharge from the permit area.

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In order to accomplish these objectives, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include five sediment impoundments, four diversion ditches and miscellaneous berms. The locations of these structures can be viewed on Drawing 5-3. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-25 through 5-34. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-1. The watershed and structure sizing analysis can be viewed in Appendix 5-2.

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In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls.

All these facilities will be reclaimed to approximate original contour. The reclamation sequence and final landform can be viewed on Drawings 5-35 and 5-38.

526.400 Air Pollution Control Facilities:

Air pollution (fugitive dust) emissions from mining and reclamation operations in the permit area will be controlled by a number of means, including:

- Haul roads will be maintained and will have water or other dust suppressants applied as appropriate.
- Road surfaces will be graded to stabilize/remove dust-forming debris as required.
- Areas adjoining primary roads will be stabilized and vegetated as required.
- Mobile equipment speeds will be controlled to minimize dusting conditions.
- Cleared vegetation debris within the mine area will be disposed of by placement in pit backfills.

A water system will be constructed to provide water for non-potable uses at the facilities and also for fugitive dust control measures. This system will consist of a water well, 6"

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water transport pipe, and two 16,000 gallon water tanks. The first water tank will be placed near the mining area and will be used specifically to load the water truck which will spray water on the active roads within the permit area to control dust. The second tank is located at the facilities area to provide a water supply to the facilities for non-potable uses (cleaning equipment, restrooms, etc…). Further details related to this water system can be viewed on Drawing 5-8C.

For details related to air pollution control and monitoring, refer to Chapter 4 and Appendix 4-2 and 4-5.

527. TRANSPORTATION FACILITIES

527.100 Classification of Roads

Primary roads are any road that is used to transport coal or spoil and is frequently used for access or other purposes for a period in excess of six months; or is to be retained for an approved postmining land use. The following is the roads that meet the classification of a primary road based on this standard:

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Roads used to transport coal or spoil in excess of six months

There are two roads that will be used to transport coal or spoil in excess of six months and are referred to as "Year 1 and 2 Mine Haul Road" and "Year 2 and 3 Mine Haul Road". These two roads will be the main accesses for the pits throughout the life of the mine. Details for these two roads are provided in Section 527.200 and on Drawings 5-22 and 5-23. In addition to these two roads, the road located within the facilities area is also classified as a primary road. This road is referred to as "Facilities Roadway" and details are described in 527.200 along with Drawings 5-22A and 5-22B.

Roads retained for an approved postmining land use

Roads retained for an approved postmining land use include the following: Access to East Pugh Property, County Road 136 (K3900), Access to Water Well and Road to Swapp Ranch. Details and locations for these roads are shown on Drawings 5-35, 5-37, 5-22A, 5-22B, 5-22C, 5-22D, 5-22E, 5-22F and 5-22G.

All other roads planned for construction within the permit area will be classified as ancillary. These will include temporary ramps, benches and equipment travel paths within the active mining area.

527.200 Description of Roads

Roads for the Coal Hollow Mine include seven primary roads, a conveyor system, and miscellaneous ancillary/temporary roads. Numerous drawings detail the designs and

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specifications for each one of the proposed facilities. The following is a description of each facility and a reference for the associated drawings:

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- Roads: Two primary mine haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits 1 through 15 (pits shown on Drawing 5-10). This road will be approximately 2,600 feet in length and will be utilized mainly during the first two years of mining. There will be three culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix A5-3. The third culvert is crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

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The second road extends from an intersection with the first road, located just south of the Lower Robinson Creek crossing, and proceeds south to approximately pit 25. This road is approximately 2,500 feet in length and will be used for the south pits 16 through 30. There is one culvert crossing along this road to cross a diversion ditch. This culvert will be a 24 inch culvert sized for maximum anticipated flows in the diversion.

The following specifications apply to these Primary mine haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5 h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

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The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

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In addition to the two roads primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus

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gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-35 and 5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

- Conveyors: A conveyor system will be used to stockpile coal and to load highway approved haul trucks for transportation to market. The first conveyor is mainly a stacker system for the coal stockpile which will be located at the coal unloading area and will be approximately 451' in length. This conveyor is estimated to be a 48" solid frame system.

The second conveyor is a coal reclaim belt that will be loaded by an above ground reclaim feeder from the coal stockpile and will convey coal to the loadout chute which will load the highway approved coal haulage trucks. This section will be approximately 290' in length. Similar to the first section, this conveyor is estimated to be a 48" solid frame system.

Drawings of this system can be viewed on Drawings 5-3 through 5-5.

527.220 Alteration or Relocation of Natural Drainageways.

As currently planned, no natural drainageways will be altered or relocated due to road construction, though a temporary diversion of Lower Robinson Creek will be constructed to allow for maximum recovery of coal. This temporary diversion of Lower Robinson Creek is not being constructed to facilitate road construction. If any other alterations or

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relocations are necessary, appropriate measures will be taken to obtain Division approval for such alterations or relocations.

Mine development work will include a temporary diversion of Lower Robinson Creek away from the mining area. This diversion has been designed for a flow capacity of a 100 year, 24 hour storm event. The sides will be graded to a 3h:1v slope and rip-rap will be appropriately placed to minimize erosion of the channel beyond current channel conditions. All specifications required to meet the requirements for such a diversion have been included in this diversion design. Appendix 5-2 details the analysis/specifications for this diversion and Drawings 5-20 and 5-21 show the details of this design.

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As part of the reclamation process, Lower Robinson Creek will be reconstructed to its approximate original location. The design for this reconstruction is shown on Drawings 5-20A and 5-21A. This design includes considerable improvements to the channel compared to the channel's current condition. The current condition is such that less than 25% of the channel within the disturbed area has a flood plain present and most of the slopes are near the angle of repose with fair to poor vegetative cover. The reconstructed channel includes stable slope angles that will be revegetated with a flood plain on both sides of the channel for the entire length reconstructed. Sharp corners in the original alignment have been rounded to sinuous curve shapes and rip-rap will be installed in the bottom section of the channel to minimize erosion. The flood plain will seeded and covered with erosion matting to control erosion until a natural vegetative condition can be attained.

527.230 Road Maintenance

All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed.

527.250. Geotechnical Analysis

No alternative specifications or steep cut slopes associated with roads are anticipated outside the active mine area. A report of appropriate geotechnical analysis will be provided should such alternative specifications or steep cut slopes where approval of the Division is required, become necessary.

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528. **HANDLING AND DISPOSAL OF COAL, OVERBURDEN, EXCESS SPOIL, AND COAL MINE WASTE:**

528.100. Coal removal, handling, storage, cleaning, and transportation areas and structures;

Coal handling activities are confined to the active pit, and the coal sizing/loading areas located north of the pit. All areas and facilities will be designed and constructed, utilized and maintained in conformance with industry standards and all applicable regulations. At the conclusion of mining, the facilities will be removed as part of final mine reclamation activities. Material from coal stockpile areas, and other areas of potential coal accumulation will be excavated and the excavated material placed in the final mined out pit.

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528.200. Overburden;

Overburden will be excavated after the removal of topsoil and subsoil as defined in Chapter 2. The overburden excavation will be accomplished by utilizing hydraulic excavators with end dump haul trucks and dozers. This process will include excavating this material in a stairstep fashion that will include benches approximately every 40 feet in depth. These benches are planned to be approximately 40 feet in width and will create an overall 2h:1v slope for the highwalls to create a stable and safe working area. This is a conservative approach for initial mining and once mining begins, ongoing geotechnical studies and monitoring will be used to further define the proper slope angle to ensure slope stability while maximizing resource recovery.

Based on the overburden isopach map (Drawing 5-15), the overburden removal has been separated into three major stages. The first stage of overburden removal is the initial mining area, Pits 1-8. These pits have a relatively low strip ratio, approximately 5:1 (refer to Drawing 5-13). In order to efficiently remove overburden for this phase, spoil from the first three pits will be placed in an excess spoil area. This excess spoil structure will hold approximately 2.7 million loose cubic yards (LCY) of material. Once the excess spoil pile is filled, overburden from Pits 4 through 8 can then be used as pit backfill as the mining progresses through Pit 8. The completion of this phase is shown on Drawing 5-17.

As mining progresses through Pits 9-15, the isopach (Drawing 5-15) shows that the overburden significantly increases. This increase and the shape of the mining boundary for the Permit Area requires a fill above approximate original contour. Material from Pits 9-15 significantly exceeds the backfill capacity available from the preceding pits (Pits 1-8). The fill above approximate original contour blends in with the excess spoil structure from Stage 1 and extends an additional 2,500 feet to the east as the mining sequence proceeds to Pit 15. In this stage, the fill above original contour is approximately 5.8 million LCY. Drawing 5-18 (Stage 2) shows the details of this stage of the overburden removal and resulting landform.

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Stage 3 overburden removal begins in Pit 16 and proceeds through Pit 30. During this stage, the strip ratio reduces significantly from Stage 2 as mining progresses to the south end of the property. As the strip ratio reduces to the south, significant backfill capacity is available in the preceding pits. This results in the distance between the backfill and the active coal face increasing. At the end of mining, an area will not be completely backfilled that is approximately 2,000 feet in length and 1,300 feet wide and will require 6.8 million yards of fill to complete reclamation to approximate original contour. The backfill configuration at the end of this stage is shown in Drawing 5-19.

The proposed plan for backfilling these final pits includes acquiring the right to mine the adjacent federal coal reserves, located immediately west of this area. This plan provides an efficient method for transitioning operations into the federal reserves. At the time that this transition occurs, overburden will be removed from the federal reserves and placed in the final pits to approximate original contour. This final landform can be viewed on Drawing 5-35 and 5-36.

In the case that Alton Coal Development is not successful with acquiring the adjacent federal coal reserves, all the fill above approximate original contour and part of the excess spoil structure will be rehandled and placed back in the remaining backfill area. The final landform for this scenario is shown on Drawing 5-37. This step requires rehandle of approximately 6.8 million yards of spoil.

The following tables show the material balance during the different phases of overburden removal for each scenario:

Preferred Scenario (Adjacent Federal Reserves Acquired)				
Phase	Overburden (LCY)	Available Backfill (LCY)	Excess Spoil (LCY)	Total Excess Spoil (LCY)
1	7,945,000	5,204,000	2,741,000	2,741,000
2	15,145,000	9,303,000	5,842,000	8,583,000
3	15,447,000	22,247,000	0	8,583,000
4 (Federal)	6,800,000	6,800,000	0	8,583,000
Total	45,337,000	36,754,000	8,583,000	8,583,000

*Loose Cubic Yards is estimated based on an overall 22% swell factor (Caterpillar Performance Handbook)

Alternate Scenario (Adjacent Federal Reserves Not Acquired)				
Phase	Overburden (LCY)	Available Backfill (LCY)	Excess Spoil (LCY)	Total Excess Spoil (LCY)
1	7,945,000	5,204,000	2,741,000	2,741,000
2	15,145,000	9,303,000	5,842,000	8,583,000
3	15,447,000	22,247,000	0	8,583,000
4 (Rehandle)	0	6,800,000	-6,800,000	1,783,000
Total	38,537,000	36,754,000	1,783,000	1,783,000

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*Loose Cubic Yards is estimated based on an overall 22% swell factor (Caterpillar Performance Handbook)

The Preferred scenario for overburden removal will minimize overall disturbance and maximize resource recovery by providing a transition into the adjacent federal reserves with minimal effect to existing reclamation and backfill in the Permit Area. This scenario will also minimize variances from approximate original contour on the federal lands by eliminating the need for an excess spoil structure from the initial boxcut once operations are transitioned into these reserves.

During the course of mining, some additional excavated overburden may be placed temporarily on mined over and backfilled areas due to operational considerations. This material will be re-excavated and moved to it's final placement location as operations allow.

All maps related to the overburden removal process can be viewed on Drawings 5-15 through 5-19.

528.300. Spoil, coal processing waste, mine development waste, and noncoal waste removal, handling, storage, transportation, and disposal areas and structures;

528.310. Excess Spoil. Excess spoil will be placed in designated disposal areas within the permit areas, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.

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Excess spoil will be placed in the area designated on Drawing 5-3 and 5-35. This fill will be placed in lifts not to exceed 4 feet in thickness. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will be sloped to approximately 2% to prevent pooling of water and to reestablish drainage similar to original flow patterns. The excess spoil placed on the non-mined areas is approximately 32 acres and varies in height from 35 to 120 feet. The area of excess fill over mined out areas (variance from approximate original contour) is an extension of the fill placed on the non-mined area and is approximately 55 acres. Combined acreage of the excess fill placed on mined and non-mined areas is 87 acres and varies in height from 60 to 100 feet above original contour. Total

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excess fill is 8.6 million yards. Design of this fill can be viewed in Drawings 5-35 through 5-36 and the geotechnical study can be viewed in Appendix 5-1.

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- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the proposed excess spoil disposal area are described in Appendix 2-1. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendices. The handling plan can be viewed on Drawing 2-2. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

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- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting. These practices include seeding and grading stockpiles that will exist for more than year to stabilize the soil.

- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  The MRP does not contemplate Alternative Postmining Land Uses.

Deleted: Not Applicable¶

- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

  A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-35, 5-36 and 5-17 through 5-19.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

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- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the excess spoil structure design has been completed by an expert in this field. The long term static safety factor for this structure design is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. Fill will be covered with subsoil and topsoil as specified in Chapter 2 to provide conditions suitable for revegetation of the area. The geotechnical study can be viewed in Appendix A5-1.

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- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

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  No durable rock fills are planned.

- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The excess spoil as shown in Drawing 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The final reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil*

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moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).

The excess spoil as shown in Drawings 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

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- *R645-301-745.100: General Requirements.*

745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

Reclamation of the excess spoil will include a topsoil cover and subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. In addition, laboratory data for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

The foundation of the excess spoil area also has high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structure.

745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

Permanent impoundments are not planned on the excess spoil area. Small depressions may be constructed as allowed by the Division to retain moisture, minimize erosion, create and enhance wildlife habitat or assist revegetation.

745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

Laboratory data representative of the overburden planned for disposal in the excess spoil area does not show acid- and toxic forming characteristics.

745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include

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diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil area. The final surface will be regraded to a contour that will route water from snowmelt and rainfall around the excess spoil as shown on the final contours Drawing 5-35. There are no manmade water courses present in the excess spoil area. No underdrains are planned for the excess spoil structure.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil area.

745.122 : Underdrains

No underdrains are planned in the excess spoil area.

745.300: Durable Rock Fills

No durable rock fills are planned.

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745.400: Preexisting Benches

The MRP does not contemplate disposal of excess spoil on preexisting benches.

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528.320. Coal Mine Waste.

The MRP does not contemplate processing coal that would produce coal mine waste.

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528.322. Refuse Piles.

The MRP does not contemplate the construction of any refuse piles.

Deleted: Not Applicable¶

528.323. Burning and Burned Waste Utilization.

The MRP does not contemplate processing coal that would produce coal mine waste, eliminating the any potential for coal mine waste fires.

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528.330. Noncoal Mine Waste.

Noncoal mine wastes including, but not limited to, grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining activities will be temporarily stored in appropriate containers

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and removed from the permit area and will be properly disposed of according to applicable State and Federal regulations.

528.332.

Final disposal of noncoal mine wastes will be in a State-approved solid waste disposal site not located within the permit area.

528.333.

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At no time will any noncoal mine waste be deposited in a refuse pile or impounding structure, nor will any excavation for a noncoal mine waste disposal site be located within eight feet of any coal outcrop or coal storage area.

528.334.

Notwithstanding any other provision to the R645 Rules, any noncoal mine waste defined as "hazardous" under 3001 of the Resource Conservation and Recovery Act (RCRA) (Pub. L. 94-580, as amended) and 40 CFR Part 261 will be handled in accordance with the requirements of Subtitle C of RCRA and any implementing regulations.

528.350. Acid-Forming and Toxic Materials

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Not Applicable¶

Debris, acid-forming, toxic-forming materials and materials constituting a fire hazard will be identified and disposed of in accordance with R645-301-528.330, R645-301-537.200, R645-301-542.740, R645-301-553.100 through R645-301-553.600, R645-301-553.900, and R645-301-747. Appropriate measures will be implemented to preclude sustained combustion of such materials; and

528.400. Dams, embankments and other impoundments.

Plans do not include using dams, embankments or other impoundments for disposal of coal, overburden, excess spoil or coal mine waste

529. **MANAGEMENT OF MINE OPENINGS.**

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground

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surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to

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minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

530 **OPERATIONAL DESIGN CRITERIA AND PLANS:**

531 GENERAL:

There are five sediment impoundments proposed for the permit area. These structures will be constructed using a combination of dozers and backhoes. The structures have been designed to contain the required storm events as specified in Appendix 5-2. The structures will have sediment removed as necessary to ensure the required capacities. Details for these structures can be viewed on Drawings 5-25, 5-26 and 5-28 through 5-32. Calculations and supporting text can be viewed in Appendix 5-2.

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There are no other coal processing waste banks, dams or embankments proposed within the permit area.

Underground mining has not occurred within the permit area.

532 SEDIMENT CONTROL:

Four diversion ditches along with five sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

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Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques

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and materials depending on the reclaimed area.

532.100 Disturbed Area:

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas. An estimated reclamation schedule is shown on Drawing 5-38.

532.200 Backfill Stabilization:

The backfilled material will be stabilized by grading to promote a reduction of the rate and volume of runoff in accordance with the applicable requirements. The excess spoil and fill above approximate original contour will be graded to a maximum angle 3h:1v slope and revegetated to minimize erosion. This area is designed with concave slopes and slope irregularities that will also assist in minimizing erosion. A geotechnical analysis of this configuration has been completed and the factor of safety is estimated at 1.6 to 1.7. This analysis can be viewed in Appendix A5-1. The remaining backfill will be placed in the mined out pit, and thus confined on all sides. The backfill will be inherently stable.

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Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

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533. IMPOUNDMENTS.

533.100.

No impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216(a) are planned for the Coal Hollow Mine.

533.110

Impoundments not included in 533.100, will be designed and constructed with a minimum static safety factor of 1.3 for a normal pool with steady state seepage saturation conditions or meet the requirements of R645-301-733.210.

The proposed sediment impoundments are expected to impound seasonal water and storms. A geotechnical analysis of these designs has been performed and can be

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reviewed in Appendix 5-1. Static safety factors for the proposed designs range from 2.2 to 5.3.

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533.200. Foundations.

Foundations for temporary and permanent impoundments will be designed so that

- *Foundations and abutments for the impounding structure are stable during all phases of construction and operation. Such foundations for temporary and permanent impoundments will be designed based on adequate and accurate information on the foundation conditions*

  Refer to Appendix 5-1 for information related to foundations of the proposed impounding structures. No permanent impoundments are proposed.

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- *All vegetative and organic materials will be removed and foundations excavated and prepared to resist failure. Cutoff trenches will be installed if necessary to ensure stability.*

  All vegetation, topsoil and subsoil as identified in Chapter 2 will be removed from the impoundment areas prior to construction. Cutoff trenches will not be necessary for stability.

- *Slope protection will be provided to protect against surface erosion at the site and protect against sudden drawdown.*

  Slopes of impoundments will be seeded and sloped to protect against erosion at the site. The high clay content and compaction characteristics of the material present at the impoundments will also assist with minimizing erosion of the slopes.

- *Faces of embankments and surrounding areas will be vegetated except that faces where water is impounded may be riprapped or otherwise stabilized in accordance with accepted design practices.*

  Faces of embankments will be vegetated to minimize erosion. Standing water in the ponds is expected to be minimal and therefore these faces will also be seeded for erosion control.

- *The vertical portion of any remaining highwall will be located far enough below the low- water line along the full extent of highwall to provide adequate safety and access for the proposed water users.*

  All highwalls will be fully covered following active use and backfilling of pits.

533.300

A rapid drawdown analysis was completed assuming the spillways are plugged, the basin fills to top of the embankments and then the water is released or pumped down to the base of basins. The soil strengths utilized were based on total stress conditions as determined from the triaxial shear tests completed for this project. It should be noted that

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rapid drawdown is highly unlikely since spillway and outlet piping will be no more than 4-feet below the top of embankments. The resulting safety factors under these conditions range from 1.2 to 1.9. Based on this analysis, no additional protection measures are needed for the impoundments in relation to rapid drawdown. Details for this analysis are provided in Appendix 5-1, pages 6 through 7 in the main section of the report.

533.600.

The MRP does not contemplate construction of impoundments that meet the criteria of MSHA, 30 CFR 77.216(a).

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533.610-620.
Not Applicable

533.700 - 714. Plans.

Each detailed design plan for structures not included in 533.610 shall:

- *Be prepared by, or under the direction of, and certified by a qualified, registered, professional engineer, except that all coal processing waste dams and embankments covered by R645-301-536 and R645-301- 746.200 shall be certified by a qualified, registered, professional engineer;*

  Designs for the proposed impoundments have been prepared by a qualified, registered, professional engineer, with assistance from a geotechnical expert. These certifications can be viewed on Drawings 5-28 through 5-31.

- *Include any design and construction requirements for the structure, including any required geotechnical information;*

  A geotechnical analysis of the impoundments has been prepared by an expert in this field. This analysis can be viewed in Appendix 5-1. Embankments will be constructed in 2 foot lifts as recommended by the analysis.

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- *Describe the operation and maintenance requirements for each structure; and*

  The proposed impoundments are designed to temporarily store water from storm events and snow melt. Long term standing water in the impoundments is anticipated to be seasonal and sediment will be removed as necessary to provide the required storage capacities. Emergency spillways have been included in the designs to provide a non-destructive discharge route should the capacities ever be exceeded. Surveys of these impoundments will be regularly conducted to ensure that design capacities are available.

- *Describe the timetable and plans to remove each structure, if appropriate.*

  All impoundments will be reclaimed at the end of operations. The estimated timeline for removal of these structures are shown on Drawing 5-38. Expected removal is year four of the mining and reclamation process. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

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Detailed designs of impoundments can be viewed on Drawings 5-28 through 5-31. Locations can be viewed on Drawing 5-3 and 5-25.

534. **ROADS**

534.100-200 Roads will be located, designed, constructed, reconstructed, used, maintained, and reclaimed so as to:

- *Prevent or control damage to public or private property;*

  All roads will be reclaimed to approximate original contour as shown on Drawings 5-35, 5-36 and 5-38. These roads are designed to control damage to public and private property.

- *Use nonacid - or nontoxic-forming substances in road surfacing; and*

  There will be no acid or toxic forming substances used in road surfacing.

- *Have, at a minimum, a static safety factor of 1.3 for all embankments.*

  All embankments are designed with static safety factors that exceed 1.3.

- *Have a schedule and plan to remove and reclaim each road that would not be retained under an approved postmining land use.*

  All roads not planned to remain postmining will be removed and reclaimed according to Drawings 5-35 and 5-36. The estimated timetable for removing these roads is shown on Drawing 5-38.

- *Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices.*

  Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles.

- *To ensure environmental protection and safety appropriate for their planned duration and use, including consideration of the type and size of equipment used, the design and reconstruction of roads will incorporate appropriate limits for grade, width, surface materials, and any necessary design criteria established by the Division.*

The following specifications apply to the Primary Mine Haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5 h:1v

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6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

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The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width. A typical cross section for the ancillary roads can be viewed on Drawing 5-24.

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The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

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In addition to the two roads primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

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In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-35 and 5-37 along with the post mining topography.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

534.300-340. Primary Roads.

Primary roads will:

- *Be located, insofar as practical, on the most stable available surfaces;*

  These roads are designed on the most practicable, stable surfaces.

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- *Be surfaced with rock, crushed gravel, asphalt, or other material approved by the Division as being sufficiently durable for the anticipated volume of traffic and the weight and speed of vehicles using the road;*

  Primary roads will be surfaced with approximately 18" of crushed rock or gravel to provide a durable surface for the anticipated volume of traffic and equipment.

- *Be routinely maintained to include repairs to the road surface, blading, filling potholes and adding replacement gravel or asphalt. It will also include revegetation, brush removal, and minor reconstruction of road segments as necessary; and*

  All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed. Roads will be reclaimed once they are no longer needed for their intended use.

- *Have culverts that are designed, installed, and maintained to sustain the vertical soil pressure, the passive resistance of the foundation, and the weight of vehicles using the road.*

  Road fill over culverts will be at minimum two times the diameter of the culvert. This is a conservative standard that has been effectively utilized at mining operations with similar equipment and mining practices.

535. SPOIL

535.100 -150 Disposal of Excess Spoil. *Excess spoil will be placed in designated disposal areas within the permit area in a controlled manner. The fill and appurtent structures will be designed using current, prudent engineering practices and will meet any design criteria established by the Division.*

- *The fill will be designed to attain a minimum long-term static safety factor of 1.5. The foundation and abutments of the fill must be stable under all conditions of construction.*

  A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision

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GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

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- *Be located on the most moderately sloping and naturally stable areas available, as approved by the Division, and placed, where possible, upon or above a natural terrace, bench or berm, if such placement provides additional stability and prevents mass movement;*

  The excess spoil is planned to be placed in an area where natural grades range from 0 to 5%. This is one of the most moderately sloping locations in the Permit Area. Stability of this structure is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

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- *Be subject of sufficient foundation investigations. Any necessary laboratory testing of foundation material, will be performed in order to determine the design requirements for foundation stability. The analyses of foundation conditions will take into consideration the effect of underground mine workings, if any, upon the stability of the fill and appurtent structures; and*

  Geotechnical borings were completed in the foundation of the proposed disposal area. Laboratory analysis of these borings has also been completed. Details of this analysis can be viewed in Appendix 5-1.

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- *Incorporate keyway cuts (excavations to bedrock) or rock buttresses to ensure stability where the slope in the disposal area is in excess of 2.8h:1v (36 percent), or such lesser slope as may be designated by the Division based on local conditions. Where the toe of the spoil rests on a downslope, stability analyses will be performed in accordance with R645-301-535.150 to determine the size of rock toe buttresses and keyway cuts*

  Permanent slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 details the stability analysis for the proposed structure.

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- *Excess spoil may be disposed of in underground mine workings,..*

  Excess spoil will not be disposed of in underground mine workings.

- *Placement of Excess Spoil. Excess spoil will be transported and placed in a controlled manner in horizontal lifts not exceeding four feet in thickness; concurrently compacted as necessary to ensure mass stability and to prevent mass movement during and after construction; graded so that surface and subsurface drainage is compatible with the natural surroundings: and covered with topsoil or substitute material in accordance with R645-301-232.100 through R645-301-232.600, R645-301-234, R645-301-242, and R645-301-243. The Division may*

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approve a design which incorporates placement of excess spoil in horizontal lifts other than four feet in thickness when it is demonstrated by the operator and certified by a professional engineer that the design will ensure the stability of the fill and will meet all other applicable requirements.

Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

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- *For the purposes of SURFACE COAL MINING AND RECLMATION ACTIVITIES the design of the spoil disposal structures will include the results of geotechnical investigations as follows:*

1) *The Character of the bedrock and any adverse geologic conditions in the disposal area;*

   Refer to Appendix 5-1.

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2) *A survey identifying all springs, seepage, and ground water flow observed or anticipated during wet periods in the area of the disposal site;*

   Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

3) *A survey of the potential effects of subsidence of the subsurface strata due to past and future mining operations;*

   There no historical underground mining operations in the proposed excess spoil area. There are also no future underground operations proposed.

4) *A technical description of the rock material to be utilized in the construction of those disposal structures containing rock chimney cores or underlain by a rock drainage blanket; and*

   There are no rock chimneys or drainage blankets proposed.

5) *A stability analysis including, but not limited to, strength parameters, pore pressures and long-term seepage conditions. These data will be accompanied by a description of all engineering design assumptions and calculations and the alternative considered in selecting the specific design specifications and methods.*

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The stability analysis and all supporting data are available in Appendix 5-1.

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- *If for the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, under R645-301-535.112 and R645-301-535.113, rock-toe buttresses or key-way cuts are required, the will include the following:*

  Neither rock-toe buttresses or key-way cuts are required under R645-301-535.112 or R645-301-535.113.

535.200. Disposal of Excess Spoil: Valley Fills/Head-of-Hollow Fills.

The MRP does not contemplate disposal of excess spoil as valley fill or head-of-hollow fills.

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535.300. Disposal of Excess Spoil: Durable Rock Fills.

The MRP does not contemplate disposal of excess spoil as durable rock fill.

Deleted: Not Applicable

535.400. Disposal of Excess Spoil: Preexisting Benches.

The MRP does not contemplate disposal of excess spoil on preexisting benches.

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535.500. Faceup operations for underground coal mine development.¶
Not Applicable¶

536. Coal Mine Waste.

The MRP does not contemplate processing of coal that would produce coal mine waste.

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537 REGRADED SLOPES:

537.100 Geotechnical Analysis:

The excess spoil structure and fill above approximate original contour are the only alternative specifications proposed. A geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas will be restored to approximate original contour.

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540 RECLAMATION PLAN:

541.100 - 400 General

When coal mining is completed, all pits will be backfilled and reclaimed in accordance with the R645 rules and this permit. All equipment, structures, and other facilities, unless approved by the Division as suitable for the postmining land use or environmental monitoring, will be removed and the affected land reclaimed.

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When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

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Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

542 NARRATIVE, DRAWINGS AND PLANS:

542-100 through 600 Plan and Timetable.

Reclamation at the Coal Hollow Mine includes both ongoing reclamation and final reclamation activities. Ongoing reclamation will follow mining operations as closely as practicable during the mine production phase. Major steps in the ongoing reclamation process are:

- Backfilling and Grading. The planned backfilling and grading operations are described more fully under section 553 below.
- Topsoil and Subsoil Replacement. Following grading, suitable topsoil and subsoil will be replaced on the regraded area. Topsoil may be direct placed from areas ahead of the mine, or may be taken from available stockpiled material. The planned topsoil operation will have topsoil ahead of the operation dozed into windrows, and loaded into trucks by a front end loader. The trucks will haul the topsoil to the regraded area, or to a temporary topsoil stockpile. Subsoil will be handled similar to topsoil. Once dumped on the regraded area, topsoil and subsoil layers will be dozed to a consistent thickness. Approximately 8 inches of topsoil is expected to be removed ahead of mining and replaced over the regraded area. Subsoil removed and replaced will average 40 inches thick and will be placed between the topsoil layer and run of mine spoil. The total profile thickness of topsoil and subsoil in mined areas will average 48 inches. Once in place, the area will be fine graded to remove small erosion features and depressions.
- Revegetation. Following replacement of topsoil the area will be revegetated by seeding. Mulch will be placed on the seedbed surface once soil amendments have been incorporated and seeding has been accomplished in areas that will be reclaimed to native plant communities. The mulch should control erosion by wind and water, decrease evaporation and seed predation, and increase survivability of the seeded species. Like the seeding methods, mulch will be applied with a variety of techniques and materials depending on the reclaimed area.

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Generally, mined areas will be backfilled and graded within approximately 180 days following coal removal, or 1,500 feet of the active coal removal face. One exception to this standard is during mining and backfilling of the final pits in the south end of the

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permit area. During this phase of mining, backfilling will follow approximately 2,000 feet from the active coal face. A detailed description of the reason for this variation are fully described in section 528 (Overburden) and the major steps can be viewed on Drawings 5-17 through 5-19. Areas needed for in-pit roads, ramps, drainage controls or areas which must be left open temporarily for operational reasons will be backfilled and graded when they are no longer needed. The rate of backfilling will depend on the availability of mined out pit areas for backfilling, and the rate of production at the mine. Based on anticipated production rates, Drawing 5-38 provides an estimated sequence and timing for reclamation.

Topsoil will be replaced on the graded areas as soon as operationally practicable. This work will depend on weather and soil conditions in the removal and replacement areas, but is generally anticipated to occur within 90 days of completion of regrading.

Revegetation activities will be seasonal in nature. As currently planned, initial seeding will occur at the first planting opportunity following replacement of topsoil. Supplemental seeding may be done subsequently as needed.

Some delay is unavoidable in reclamation of the initial mining areas due to the time required to establish the initial working pit and backfill area, and to achieve a steady state excavation/backfill operation. As currently planned the initial mining areas will be backfilled to the planned post mining contour, graded, and the topsoil replaced by late in the first year or in the first half of the second year of mining. Reclamation activities will proceed at the regular planned rate thereafter. Proposed final reclamation contours and cross sections can be viewed on Drawings 5-35 and 5-36.

The sequence and timing of reclamation activities is dependent on the coal production rate. Should that rate differ significantly from the current plan, the reclamation schedule will also vary.

Final reclamation includes the following:

- Backfilling and Grading. Backfilling of all final pits will commence at the conclusion of coal production. All highwalls, spoil piles, and depressions will be removed, except that small depressions may be constructed if they are needed to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation. No permanent final pit impoundments are currently planned. The excess spoil structure will remain. All exposed coal seams, and acidic or toxic-forming strata will be covered with at least five feet of noncombustible material.
- Topsoil and Subsoil Replacement. 8 inches of topsoil underlain by 40 inches of subsoil will be placed on the backfilled pits and excess spoil. Other disturbed areas will have topsoil replaced (including facilities sites, roads etc.).
- Removal of Structures. Before abandoning the permit area or seeking bond release, all structures not needed for the approved post mining land use will be removed and reclaimed. The Lower Robinson Creek diversion is proposed to be

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temporary. Material from the coal stockpile base area and other areas where coal spillage may accumulate will be excavated and placed in a controlled manner in the final pit and covered with noncombustible material to prevent sustained combustion. The only structure planned to exist postmining is the water well with details shown in Drawing 5-8C and location shown on 5-3, 5-35 and 5-37.

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- Removal of Roads. Roads not retained for use under an approved postmining land use will be reclaimed immediately after they are no longer needed for mining and reclamation operations. Roads that are not listed as postmining roads in this section, will be closed to traffic; and all bridges and culverts removed. Prior to reclamation, surface material that is incompatible with the postmining land use and revegetation requirements will be removed from the roads and properly disposed of at the mine site. The roadbeds will be scarified or ripped to break up the surface. Topsoil will be replaced on the roadbed and the surface revegetated in accordance with the standards set forth in R645.

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  Roads that will remain postmining are the following:
  - Road to Water Well with details shown on Drawing 5-22D
  - Road to east C. Burton Pugh property with details shown on Drawing 5-22C
  - County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
  - Road to Swapp Ranch (same specification as the Water Well Road)

  The location of these roads is shown on Drawings 5-35 and 5-37 along with the post mining topography.

- Removal of Water Control Structures. All sedimentation control structures, including ditches, berms and sedimentation ponds not retained as part of the approved post-mining land use will be removed, the areas regraded, topsoiled, and revegetated. All water control structures will be removed at final reclamation.

Final pit backfilling, removal of buildings, roads and other facilities, along with replacement of topsoil is expected to require approximately 15 months after the last coal is removed. In the alternate reclamation scenario (Drawing 5-37), the bulk of this period will be required to backfill the final pits.

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542.700. Final Abandonment of Mine Openings and Disposal Areas.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by

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people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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542.720. Disposal of Excess Spoil.

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A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

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Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion.

542.730. Disposal of Coal Mine Waste.

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The MRP does not contemplate processing of coal that would produce coal mine waste.

542.740. Disposal of Noncoal Mine Wastes.

Noncoal mine waste including, but not limited to grease, lubricants, paints, flammable liquids, garbage, abandoned mining machinery, lumber and other combustible materials generated during mining activities will be placed and temporarily stored in a controlled manner in a designated portion of the permit area and hauled offsite to a state approved recycling or solid waste disposal site. Final disposal of noncoal mine waste will not take place within the permit area.

542.800. Reclamation Cost.

The amount of the bond will depend upon the requirements of the ***approved*** permit and reclamation plan (R645-830.120).

A preliminary estimate of reclamation costs is included in Appendix 8-1. This estimate is based upon the proposed plan. A final bond estimate will be provided by the applicant to the Division upon completion of the approved permit and reclamation plan.

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550. RECLAMATION DESIGN CRITERIA AND PLANS

551. SEALING AND CASING OF UNDERGROUND OPENINGS

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

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If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

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Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

552. **PERMANENT FEATURES.**

552.100

Small depressions may be constructed if they are needed to retain moisture, minimize erosion, create and enhance wildlife habitat, or assist revegetation.

552.200

All impoundments will be reclaimed, no permanent impoundments are proposed.

553 **BACKFILLING AND GRADING:**

Backfilling and Grading of the mined area will proceed in conjunction with coal recovery operations.

The planned mine will recover approximately 5.02 million tons of coal, and remove approximately 31.6 million Bank Cubic Yards (BCY) of overburden. The following is a description of the overburden removal and backfilling process:

Based on the overburden isopach map (Drawing 5-15), the overburden removal and backfilling process has been separated into three major stages. The first stage of this process is for the initial mining area, Pits 1-8. These pits have a relatively low strip ratio, approximately 5:1 (refer to Drawing 5-13). In order to efficiently remove overburden for this phase, spoil from the first three pits, including Pit 2 the boxcut, will be placed in an excess spoil area located immediately west of Pit 1. This excess spoil structure will hold approximately 2.7 million loose cubic yards (LCY) of material and is shown on Drawing 5-17. Once the excess spoil pile is filled, overburden from Pits 4 through 8 can then be used as pit backfill as the mining progresses through Pit 8. The completion of this phase is shown on Drawing 5-17.

As mining progresses through Pits 9-15, the isopach (Drawing 5-15) shows that the overburden significantly increases. This increase and the shape of the mining boundary for the Permit Area require a fill above approximate original contour that is an extension of the excess spoil pile. Material from Pits 9-15 significantly exceeds the backfill

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capacity available from the preceding pits (Pits 1-8). The fill above approximate original contour blends in with the excess spoil structure from Stage 1 and extends an additional 2,500 feet to the east as the mining sequence proceeds to Pit 15. In this stage, the fill above original contour is approximately 5.8 million LCY. Drawing 5-18 (Stage 2) shows the details of this stage of the overburden removal and resulting landform.

Stage 3 overburden removal begins in Pit 16 and proceeds through Pit 30. During this stage, the strip ratio reduces significantly from Stage 2 as mining progresses to the south end of the property. As the strip ratio reduces to the south, significant backfill capacity is available in the preceding Pit 15. This results in the distance between the backfill and the active coal face increasing because there is a lack of spoil in the lower ratio pits as mining proceeds south to fill the preceding higher ratio area. At the end of mining this phase, an area will not be completely backfilled that is approximately 2,000 feet in length and 1,300 feet wide and will require 6.8 million yards of fill to complete reclamation to approximate original contour. This remaining pit provides an open pit adjacent to the federal coal reserves for backfilling of overburden so that a smooth transition can be made without developing another boxcut and an excess spoil area. The backfill configuration at the end of this stage is shown in Drawing 5-19.

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The proposed plan (Preferred Scenario) for backfilling the final pits is based on the assumption that Alton Coal Development, LLC will be successful with acquiring the adjacent federal coal reserves, located immediately to the west of the project area. This Preferred scenario for backfilling will minimize overall disturbance, and maximize resource recovery by providing a transition into the adjacent federal reserves with minimal effect to existing reclamation and backfill in the Permit Area. This scenario will also minimize variances from approximate original contour on the federal lands by eliminating the need for an excess spoil structure from the initial box cut as operations are transitioned into these reserves. In addition, this scenario provides a method for implementing concurrent reclamation during the project by eliminating temporary stockpiles of spoil that can not be reclaimed and have to be placed in backfilled areas at a later time. Use of temporary spoil stockpiles significantly delay reclamation and this plan eliminates the need for these type of temporary structures.

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At the time that the transition occurs into the federal reserves, overburden will be removed from the federal reserves and placed in the final pits to approximate original contour. This final landform can be viewed on Drawings 5-35 and 5-36.

The following is an overburden and backfill balance for this scenario:

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Preferred Scenario (Adjacent Federal Reserves Acquired)				
Phase	Overburden (LCY)	Available Backfill (LCY)	Excess Spoil (LCY)	Total Excess Spoil (LCY)
1	7,945,000	5,204,000	2,741,000	2,741,000
2	15,145,000	9,303,000	5,842,000	8,583,000
3	15,447,000	22,247,000	0	8,583,000
4 (Federal)	6,800,000	6,800,000	0	8,583,000
Total	45,337,000	36,754,000	8,583,000	8,583,000

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*Loose Cubic Yards is estimated based on an overall 22% swell factor (Caterpillar Performance Handbook)

In the case that Alton Coal Development is not successful with acquiring the adjacent federal coal reserves, an alternate scenario has been developed. The Alternate scenario requires that all fill above approximate original contour and part of the excess spoil structure will be rehandled and placed in the remaining backfill area. The final landform for this scenario is shown on Drawing 5-37. This step requires rehandle of approximately 6.8 million yards of spoil. In this scenario, reclamation of the project area will be significantly delayed and the transition into adjacent federal coal reserves at a later date will disturb additional backfill along the west permit boundary approximately 2,000 feet in length by 230 feet wide (10 acres). An additional excess spoil structure would then need to be constructed on the federal lands to place spoil from the initial boxcut. Part of the excess spoil would likely be material removed from the Permit Area to access the coal beneath the Permit Area highwalls and provide the proper layback of the backfill material along the Permit boundary.

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The following table summarizes the overburden and backfill balance for this scenario:

Alternate Scenario (Adjacent Federal Reserves Not Acquired)				
Phase	Overburden (LCY)	Available Backfill (LCY)	Excess Spoil (LCY)	Total Excess Spoil (LCY)
1	7,945,000	5,204,000	2,741,000	2,741,000
2	15,145,000	9,303,000	5,842,000	8,583,000
3	15,447,000	22,247,000	0	8,583,000
4 (Rehandle)	0	6,800,000	-6,800,000	1,783,000
Total	38,537,000	36,754,000	1,783,000	1,783,000

In both scenarios (Preferred and Alternate), Rough backfilling and grading operations will follow coal removal by not more than 60 days or 1500 linear feet except for the exemption in the south end of the mining area (Pits 24 through 30), which is described above in a step by step manner in the Stage 3 overburden removal process, the above tables and Drawings 5-17 through 5-19. This exemption is expected to take place in Year 3 of the mining process.

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Major steps in the backfilling and grading process are:

- Backfilling of the Mined Out Pit. Material from active pits will be used to backfill mined out pits as mining progresses. Material will be placed in the in-pit backfill in lifts, until the approximate planned final elevation is reached. Working stability in the backfill will be achieved by placement of the material, and control of the overall spoil face slope at stable angles. The mined out area will be filled to its planned post-mining elevation, which approximates the pre-mining land contour. The backfill will be inherently stable because the exposed surface will

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have shallow slopes, and the backfill surface will not be significantly higher than the surrounding undisturbed ground with the exception of the variance shown on Drawing 5-3.

- Backfilling of Ramps. Ramps and travelways within the active mining will be moved as necessary for safe operation and efficient hauling of overburden and coal. When a particular ramp or travelway is no longer needed, it will be backfilled with excavated overburden from the advancing pit.
- Grading. After backfilling is complete in each mined out area, the area will be graded using dozers and motor graders to achieve the planned post-mining contour, facilitate stable positive drainage patterns, and to blend in with the surrounding topography. Postmining slopes will not exceed either the angle of repose or such lesser slope as is necessary to achieve a minimum long-term static safety factor of 1.3 and prevent slides. A geotechnical analysis has been completed for the excess spoil structure and can be found in Appendix 5-1.

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Timing of backfilling and grading operations will depend on the rate of mine advance and the availability of backfill space and material. It is planned that mined areas will be backfilled and graded within approximately 180 days following coal removal, or 1,500 feet of the active coal removal face. As described in the previous text and shown on Drawing 5-19, there will be a variance from this standard in the final pits. Areas needed for in-pit roads, ramps, drainage controls or areas which must be left open temporarily for operational reasons will be backfilled and graded as they become available.

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Some delay is unavoidable in backfilling the initial mining areas due to the time required to establish the initial working pit and backfill area, and to achieve a steady state excavation/backfill operation. As currently planned, the initial mining areas will be backfilled to the planned post mining contour, graded, and the topsoil replaced in late Year 1.

553.110

All areas except for the excess spoil pile and the variance from AOC (approximately 85 acres), will be restored to approximate original contour as shown on Drawing 5-35. R645-301-553.800 (Thick Overburden) does apply to this surface mine. In areas where excess spoil and variance from approximate original contour occur, the slopes will be regraded to a maximum angle of 3h:1v and most slopes are flatter as shown on Drawing 5-35 and 5-36. A geotechnical analysis has been completed to verify that the spoil material will be stable long term. This analysis can be viewed in Appendix 5-1.

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553.120

All highwalls will be eliminated in the final landform. Small depressions may be constructed as needed to retain moisture, minimize erosion, create and enhance wildlife habitat or assist vegetation. All spoil piles will be eliminated with the exception of the planned excess spoil and variance from original contour as shown on Drawing 5-35.

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553.130

Postmining slopes will not exceed the angle of repose which is expected to be approximately 1.5h:1v as described in Appendix 5-5. This appendix is an analysis by Dr. Ben Seegmiller addressing the safety factor for the post mining slope with the lowest safety factor outside the excess spoil area. This analysis concludes that a minimum safety factor of these slopes will be 1.7 which exceeds the requirement of 1.3. The excess spoil slopes have been analyzed by Alan Taylor, P.E., an expert in geotechnical engineering. These slopes also significantly exceed the required 1.3 safety factor. Details for this analysis by Mr. Taylor can be viewed in Appendix 5-1.

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553.140

Slopes will be regraded and vegetated to minimize erosion and water pollution on and off the site.

553.150

Backfilling and grading will be conducted to support the approved postmining land use.

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553.200 Spoil and Waste.

Spoil located in the excess spoil area and the variance from approximate original contour will be compacted to 85% of the standard Procter to provide long term stability of these structures. Remaining backfill in mined out areas will be confined and regraded to approximate original contour and will therefore not require compaction for long term stability. Subsoil will be placed over spoils and waste prior to placement of topsoil. This subsoil layer will provide a covering with minimal infiltration rate to prevent leaching of toxic materials.

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553.210

Excess spoil from surface mining activities will be disposed of according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400. Detail for meeting these standards can be reviewed in the corresponding sections.

553.220

The MRP does not contemplate placing spoil on areas outside the mined-out surface area for the purposes of restoring the approximate original contour.

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553.300. Covering of Exposed Coal Seams, and Acid- and Toxic-Forming Materials.

Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used, or produced during mining will be adequately covered with nontoxic and noncombustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and on the approved postmining land use.

553.400. Cut and Fill Terraces

The MRP does not contemplate constructing cut and fill terraces.

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553.500. Previously Mined Areas (PMA's) and Continuously Mined Areas (CMA's).

The MRP does not contemplate operations associated with PMA's, CMA's, or areas with remaining highwalls.

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553.600. Highwall Management

The MRP does not contemplate operations associated with PMA's, CMA's, or areas with remaining highwalls.

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553.700. Backfilling and Grading: Thin Overburden.

The Coal Hollow project is expected to have approximately 1.8 million loose cubic yards of excess spoil; therefore R645-301-800 applies rather than R645-301-553.700.

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553.800. Backfilling and Grading: Thick Overburden.

553.810

The spoil will be placed to attain the lowest practicable grade, and will not exceed the angle of repose for the material. A sequence of the steps for practicable movement of the excess spoil is shown on Drawings 5-17 through 5-19. The slopes on the excess spoil and variance from the approximate original contour will not exceed 3h:1v or flatter, which will provide a long-term, stable structure. The general design of the tall (60'+ vertically) excess spoil slopes is 5h:1v to 4h:1v to 3h:1v, bottom to top. This design creates a concave shape slope that resembles naturally occurring hills in the area and will minimize erosion. In addition, irregularities (flatter areas) have been added to break up long slopes. The overall shape of the pile is also irregular to be similar to hills in the surrounding area. The final configuration of this excess spoil can be viewed in Drawings 5-35 and 5-36. The angle of repose for the spoil material is expected to be 1.5h:1v as provided in Appendix 5-5 in the Introductory Overview (page 1) by Dr. Ben Seegmiller, an expert in the field of rock mechanics and slope stability. The design slopes are significantly flatter than the angle of repose expected for the spoil.

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553.820 - 553.830

Backfilling and Grading of thick overburden will meet the following requirements:

- *R645-301-211: The applicant will present a description of the premining soil resources as specified under R645-301-221. Topsoil and subsoil to be saved under R645-301-232 will be separately removed and segregated from other material.*

  The soil resources for the proposed excess spoil disposal area are described in 2-1. A plan has been developed for removal of topsoil and suitable subsoil based on the soil descriptions in this appendices. The handling plan can be viewed on Drawing 2-2. Topsoil and acceptable subsoil will be separately removed and segregated from other material prior to placement of any spoil.

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- *R645-301-212: After removal, topsoil will be immediately redistributed in accordance with R645-301-242, stockpiled pending redistribution under R645-301-234, or if demonstrated that an alternative procedure will provide equal or more protection for the topsoil, the Division may, on a case-by case basis, approve an alternative;*

  Excess spoil will have topsoil and subsoil redistributed in an approximately uniform, stable thickness with the approved post mining land use, contours and surface water drainage systems. Material handling practices will prevent excess compaction of these materials. Handling practices will also protect the materials from wind and water erosion before and after seeding and planting.

- *R645-301-412.300: Criteria for Alternative Postmining Land Uses.*

  Not Applicable

- *R645-301-512.210: Excess Spoil. The professional engineer experienced in the design of earth and rock fills will certify the design according to R645-301-535.100.*

  A professional engineer experienced in the design of earth and rock fills with assistance from a geotechnical expert has certified the design according to R645-301-535.100. These certifications can be viewed on Drawings 5-35, 5-36 and 5-17 through 5-19.

- *R645-301-512.220: Durable Rock Fills*

  No durable rock fills are planned.

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- *R645-301-514.100: Excess Spoil. The professional engineer or specialist will be experienced in the construction of earth and rock fills and will periodically inspect the fill during construction. Regular inspections will also be conducted during placement and compaction of fill materials.*

  A professional engineer or specialist that is experienced in the construction of earth and rock fills will inspect the fill during construction and regular inspections will also be conducted during placement and compaction of fill materials.

- *R645-301-528.310: Excess spoil will be placed in designated disposal areas within the permit areas within the permit area, in a controllable manner to ensure mass stability and prevent mass movement during and after construction. Excess spoil will meet the design criteria of R645-301-535. For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, the permit application must include a description of the proposed disposal site and the design of the spoil disposal structures according to R645-301-211, R645-301-212, R645-301-412.300, R645-301-512.210, R645-528.310, R645-301-535.100 through R645-301-535.130, R645-301-535.300 through R645-301-535.500, R645-536.300, R645-301-542.720, R645-301-553.240, R645-301-745.100, R645-301-745.100, R645-301-745.100, R645-301-745.300, and R645-301-745.400.*

  Excess spoil will be placed in the area designated on Drawing 5-3 and 5-35. This fill will be placed in lifts not to exceed 4 feet. The material will be transported from the overburden removal area to the fill by end dump haul trucks and a dozer(s) will spread the spoil to this lift thickness. The fill will meet at minimum 85% compaction as related to the standard Procter. Final slopes will be regraded to a maximum slope of 3h:1v. The top of the fill will sloped to approximately 2% to prevent pooling of water and to reestablish drainage similar to the original flow patterns. The excess spoil placed on the non-mined areas is approximately 32 acres and varies in height from 35 to 110 feet. The area of excess fill over mined out areas (variance from approximate original contour) is an extension of the fill placed on the non-mined area and is approximately 55 acres. Combined acreage of the excess fill placed on mined and non-mined areas is 87 acres and varies in height from 60 to 100 feet above original contour. Total excess fill is 8.6 million yards. Design of this fill can be viewed in Drawings 5-35 through 5-36 and the geotechnical study can be viewed in Appendix 5-1.

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- *R645-301-535.100 through R645-301-130: Disposal of Excess Spoil*

  A geotechnical analysis of the excess spoil structure design has been completed by an expert in this field. The long term static safety factor for this structure design is estimated at 1.6 to 1.7. Lifts will be placed in thicknesses not to exceed 4 feet. The lifts will meet 85% compaction by the standard Procter. The fill will be graded to allow for drainage similar to original patterns and to prevent excessive infiltration of water. Fill will be covered with subsoil and topsoil as

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specified in Chapter 2 to provide conditions suitable for revegetation of the area. The geotechnical study can be viewed in Appendix A5-1.

- *R645-301-535.300 through R645-301-535.500: Disposal of Excess - Spoil Durable Rock Fills.*

  Not Applicable

- *R645-301-536.300: Disposal of Coal Mine Waste in Excess Spoil*

  No coal mine waste is planned in the excess spoil area.

- *R645-301-542.720: Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to ensure that the final fill is suitable for reclamation and revegetation compatible with the natural surroundings and the approved postmining land use. Excess spoil that is combustible will be adequately covered with noncombustible material to prevent sustained combustion. The reclamation of excess spoil will comply with the design criteria under R645-301-553.240.*

  The excess spoil as shown in Drawing 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. No combustible excess spoil will be placed in the proposed structure. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v.

- *R645-301-553.240: The final fill configuration of the fill (excess spoil) will be suitable for the approved postmining land use. Terraces may be constructed on the outslope of the fill if required for stability, control of erosion, to conserve soil moisture, or to facilitate the approved postmining land use. The grade of the outslope between terrace benches will not be steeper than 2h:1v (50 percent).*

  The excess spoil as shown in Drawings 5-35 and 5-36 will be suitable to the surrounding area and for the postmining land use of primarily grazing. The reclamation of the spoil does not include any terraces and the slopes will not exceed 3h:1v. This slope angle has been utilized at similar mining operations and found to be suitable for erosion control and revegetation of reclaim slopes. The long term static safety factor for these slopes is estimated to be 1.6 to 1.7.

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- *R645-301-745.100: General Requirements.*

  745.110: Excess Spoil will be placed in designated disposal areas within the permit area, in a controlled manner to:

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745.111: Minimize the adverse effects of leaching and surface water runoff from the fill on surface and underground water;

Reclamation of the excess spoil will include a topsoil cover and subsoil layer. Infiltration through the reclamation is expected to be minimal based on the high clay content of these soils. In addition, laboratory data for the overburden shows that there is minimal potential for leaching of pollutants should infiltration rates become higher than expected.

The foundation of the excess spoil area also has high clay content with minimal potential for infiltration. This will provide an additional, natural barrier to protect ground water present beneath the proposed structure.

745.112: Ensure permanent impoundments are not located on the completed fill. Small depressions may be allowed by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and

Permanent impoundments are not planned on the excess spoil area. Small depressions are also not planned in the excess spoil and are not viewed as a necessary enhancement to final reclamation based on average annual moisture data and the proposed slope configuration of the pile.

745.113: Adequately cover or treat the excess spoil that is acid- and toxic forming with nonacid nontoxic material to control the impact on the surface and ground water in accordance with R645-301-731.300 and to minimize adverse effects on plant growth and approved postmining land use.

Laboratory data representative of the overburden planned for disposal in the excess spoil area does not show acid- and toxic forming characteristics.

745.120: Drainage Control. If the disposal area contains springs, natural or manmade water courses, or wet weather seeps, the fill design will include diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

A spring and seep survey available in Chapter 7 has identified no springs or wet weather seeps in the proposed excess spoil area. The final surface will be appropriately regraded to a contour that will route natural water from snowmelt and rainfall around the excess spoil as shown on the final contours Drawing 5-35. There are no manmade water courses present in the excess spoil area. No underdrains are planned for the excess spoil structure.

745.121: Diversions will comply with the requirements of R645-301-742.300

No diversions are planned in the excess spoil area.

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745.122 : Underdrains

No underdrains are planned in the excess spoil area.

745.300: Durable Rock Fills

No Durable Rock fills are planned.

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745.400: Preexisting Benches

The MRP does not contemplate disposal of excess spoil on preexisting benches.

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Alton Coal Development, LLC will provide the Division, as part of the annual report for each calendar year, a plan view outline of the coal recovery, a 5' interval contour map of backfill progress and a reclamation progress map. This information will be submitted by June 30th of each calendar year.

560. Performance Standards

Coal mining and reclamation operations will be conducted in accordance with the approved permit and requirements of R645-301-510 through R645-301-553.

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The mine support facilities will include an office, shop, wash bay, oil containment, fuel containment, coal stacking system, and a coal loadout system. These facilities will be constructed on an isolated section of the permit area that is approximately 29 acres. This area is located immediately north of Lower Robinson Creek, in Township 39 South, Range 5 West, Section 19. A diversion ditch will route water from the upgradient area immediately east of the area around the facilities area and into a tributary of Lower Robinson Creek as shown on Drawing 5-3. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. Details for this impoundment can be viewed on Drawing 5-28.

The following is a detailed description of each proposed facility and a reference to where detailed drawings can be found:

Office: The office will be located on the northwest corner of the facilities area, immediately adjacent to the facilities access road. This building will be a steel structure with concrete footers. This structure will be 150 feet long by 100 feet wide and will be two stories in height. The office will provide working space for administrative and technical personnel. Details for the office can be viewed on Drawings 5-3 and 5-6.

Shop: The shop will be located on the northeast side of the facilities area. This building will be a steel structure with concrete floors and foundation. The structure will be approximately 200 feet long by 100 feet wide and 50 feet high. This building will be used for maintenance of equipment, parts storage, tool storage, and office space for maintenance personnel. Details for this building can be viewed on Drawings 5-3 and 5-7.

Wash Bay: The wash bay will be located immediately east of the shop. This building will be a steel structure with a concrete foundation. The structure will be 50 feet long by 60 feet wide and 50 feet high. Included will be a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment. Details for this structure can be viewed on Drawings 5-3, 5-8, and Appendix A5-4.

Oil and Fuel Containments: The oil and fuel containments will be concrete structures appropriately sized for storage. The oil containment will contain 55 gallon barrels and up to 2,000 gallon totes. This containment will be 80 feet long by 30 feet wide and 3 feet deep. The fuel containment will store 3 fuel tanks. Included will be a 4,000 gallon unleaded fuel tank and two 12,000 gallon diesel tanks. This structure will 50 feet long by 30 feet wide and 3 feet deep. Details for this structure can be viewed on Drawings 5-3 and 5-8.

Coal Stacking System: The coal stacking system will be located in the central part of the facilities area. This system will include a coal hopper, coal feeder breaker, feed conveyor, crusher, and an inclined conveyor belt. Trucks will dump coal into the coal hopper which will funnel coal through the feeder breaker onto a short feed conveyor belt. This conveyor belt will transport the coal approximately 253 feet to a crusher that will size the coal appropriately for market. Once the coal is sized through the crusher, it will enter an inclined stacker conveyor belt that is angled at approximately 16 degrees and is 322 feet long. This system will be a radial conveyor which will feed a coal stock pile with a live storage of approximately 150,000 tons. This system can be viewed on Drawings 5-3 through 5-5.

Coal Loadout System: The coal loadout system will be located in the central part of the facilities area. This system will include feeder chutes, a coal reclaim conveyor and an inclined conveyor. The feeder chutes will be located beneath the coal stockpile and provide a method for loading the coal onto the reclaim conveyor. The coal reclaim system includes two sections of conveyor. One conveyor is approximately 480 feet in length and the other is 260 feet. These conveyer sections feed an inclined belt that puts coal into the loadout hopper. This loadout hopper will load highway approved haul trucks that transport coal to market.

During mine development and the initial mining period, some facilities of a temporary nature such as mobile buildings and crusher/stacking conveyors may be utilized.

CHAPTER 7

R645-301-700. HYDROLOGY

711. **GENERAL REQUIREMENTS**

711.100 – 711.500 Contents

This chapter provides a description of the hydrology and hydrogeology of the proposed Coal Hollow Mine permit and adjacent area. Specifically, this permit section includes descriptions of existing hydrologic resources according to R645-301-720, proposed operations and potential impacts to the hydrologic balance according to R645-301-730, methods and calculations utilized to achieve compliance with the hydrologic design criteria and plans according to R645-301-740, applicable hydrologic performance standards according to R645-301-750, and reclamation activities according to R645-301-760.

This information is presented in subsequent sections of this chapter and in Appendix 7-1. Appendix 7-1 includes a comprehensive characterization of groundwater and surface-water systems in the proposed Coal Hollow permit and adjacent areas, recommendations for groundwater and surface-water monitoring, and the results of a field investigation regarding the potential for alluvial valley floors in the proposed Coal Hollow Mine permit and adjacent area. It should be noted that Appendix 7-1 may be updated periodically in the future as additional hydrologic and hydrogeologic data become available.

712 **CERTIFICATION**

All cross sections, maps, and plans have been prepared per R645-301-512. Compliance with this section has been completed and certifications are available on all Drawings. The cross sections and maps that are included in this permit application and are required to be certified have been prepared by or under the direction of a qualified, registered, professional engineer or a professional geologist, with assistance from experts in related fields such as hydrology, geology and landscape architecture.

713 **INSPECTION**

Impoundments will be inspected as described under R645-301-514.300. Designs for proposed impoundments in the proposed Coal Hollow permit area are shown in Drawings 5-25 through 5-31 and Appendices A5-1 and A5-2. No impoundments or sedimentation

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ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the proposed Mine Permit Area.

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

720 ENVIRONMENTAL DESCRIPTION

721 GENERAL REQUIREMENTS

The existing, pre-mining hydrologic resources within the permit and adjacent areas that may be affected by coal mining and reclamation operations are described in Appendix 7-1 and are summarized below.

Groundwater Resources

A spring and seep survey of the proposed Coal Hollow Mine permit and surrounding area has been conducted by Petersen Hydrologic, LLC (see sub-appendix B of Appendix 7-1). The locations of springs and seeps in the proposed permit and adjacent area are shown on Drawing 7-1. Seasonal discharge and field water quality measurements for springs and seeps in the proposed Coal Hollow Mine permit and adjacent area have been submitted electronically to the Utah Division of Oil, Gas and Mining Utah Coal Mining Water Quality Database (UDOGM, 2007). Baseline discharge and water quality data for groundwater resources in the proposed Coal Hollow Mine permit and adjacent area are have also been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007). Locations of baseline monitoring stations are shown on Drawing 7-2. Locations of water rights in and adjacent to the proposed Coal Hollow Mine permit area are shown on Drawing 7-3. Water rights data from the proposed Coal Hollow Mine permit and adjacent area are detailed in Appendix 7-3. A plot showing potentiometric levels in alluvial groundwater systems in the proposed Coal Hollow Mine permit and adjacent area is presented in Drawing 7-13.

There are no domestic water supply springs or wells in the proposed permit area. However, wells and springs that provide water for domestic and livestock use are located on and adjacent to the proposed permit area (Drawing 7-2). Some lands east of and

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adjacent to the proposed Coal Hollow Mine permit area have historically been irrigated using water from alluvial springs. However, irrigation from these springs was apparently limited to home gardens and a few fruit trees. No irrigation of these lands (other than some yard watering at the Swapp Ranch house) is currently occurring nor has it occurred in at least the past 10 years (Personal communication, Burton Pugh, 2008; Richard Dames, 2007). Additionally, limited irrigation of lands occurs east of the proposed Coal Hollow permit area using surface waters derived from runoff from the adjacent Paunsaugunt Plateau area. Irrigation of these lands is largely limited to years with appreciable precipitation and stream runoff (Personal communication, Darlynn Sorensen, 2008).

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Groundwater discharge occurs from springs and seeps in the upland areas of the Paunsaugunt Plateau east of the permit area (Tilton, 2001; Appendix 6-3). However, these springs discharge from rock strata that are topographically and stratigraphically up-gradient of and considerable distances from the proposed Coal Hollow Mine permit area. Consequently, groundwater systems in these areas will not be impacted by mining activities and these are not considered further here.

Groundwater resources in the Tropic Shale and underlying Dakota Formation in the permit and adjacent area are not appreciable. During drilling activities in the proposed Coal Hollow Mine permit and adjacent area, appreciable groundwater inflows were not encountered in the Tropic Shale. Other than a single seep (SP-37; Drawing 7-1) which discharges at a rate of less than 0.05 gpm from an apparent fracture system in a sandy horizon along the eastern margin of lower Sink Valley, no springs or seeps with measurable discharge have been identified in the Tropic Shale. The lack of appreciable groundwater discharge in the Tropic Shale is a result of the poor water transmitting properties of the marine shale unit. While sandstone units occur stratigraphically higher in the Tropic Shale in the surrounding area, in areas proposed for surface mining, the unit present consists of a fairly uniform sequence of soft shale, silty shale, and claystone with minor siltstone horizons. Competent sandstone strata in the Tropic Shale overlying proposed mining areas was not observed during drilling. The Tropic Shale acts as a barrier impeding downward migration of groundwater in the proposed Coal Hollow Mine permit and adjacent area where it is present. The unit also forms a basal confining layer for alluvial groundwater systems in the proposed permit area.

Groundwater discharge from the Dakota Sandstone in the permit and adjacent area is also meager. The Dakota Formation consists of shaley strata interbedded with lenticular, fine- to medium-grained sandstone and coal. Because of the pervasiveness of interbedded low-permeability horizons in the formation and the vertical and lateral discontinuity of sandstone horizons, the potential for vertical and horizontal movement of groundwater is limited. While no springs discharge from the Dakota Formation in the permit area, a spring with a discharge of about 1 gpm and displaying little seasonal variability in discharge (SP-4; Drawing 7-1) discharges from an apparent fault zone in the Dakota Formation approximately 1.1 miles south of the proposed Coal Hollow permit area. Additionally, two seeps with discharges of less than 0.05 gpm (SP-27 and SP-34; Drawing 7-1) seep from the Dakota Formation in lower Sink Valley more than ½ mile

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south of the proposed Coal Hollow Mine permit area. The results of slug testing performed on wells screened in the Smirl coal seam indicate relatively low values of hydraulic conductivity for the coal seam (Table 7-8). In much of the proposed mining area, the coal seam is dry (UDOGM, 2007). Thus, appreciable migration of groundwater through the Smirl coal seam is not anticipated.

No water wells are known to exist in the Tropic Shale or Dakota Formation in the proposed Coal Hollow Mine permit and adjacent area, demonstrating the inability of these formations to transmit useful quantities of water to wells. Groundwaters from the Tropic Shale and Dakota Formation do not contribute measurable baseflow to streams in the proposed permit and adjacent area (at least at the surface in stream channels).

Natural groundwater discharge in the permit and adjacent area occurs primarily from alluvial sediments. Alluvial discharge occurs both as discrete springs and seeps (Drawing 7-1) and also locally as diffuse seepage to the surface. Groundwater discharge areas in the proposed Coal Hollow Mine permit and adjacent area are shown on Drawing 7-4 (see also photograph section). The area of most appreciable alluvial groundwater discharge occurs in central Sink Valley in the northwest quarter of Section 29, T39S, R5W (see Drawing 7-4; groundwater discharge area A). The alluvial groundwater system in this area exists under artesian conditions, resulting from the presence of a considerable thickness of sloping, low permeability clayey sediments overlying coarser, water-bearing alluvial sediments at depth (See cross-section Y – Y' in Drawing 6-9). The artesian alluvial groundwater system in Sink Valley is likely recharged via mountain-front-recharge along the flanks of the Paunsaugunt Plateau to the east and north of the proposed Coal Hollow Mine permit area. This artesian alluvial groundwater system that exists along the eastern margins of Sink Valley is likely continuous from near mountain-front recharge areas southward along the eastern margins of Sink Valley to the lower portion of Sink Valley. Discharge from the alluvial groundwater systems in and adjacent to the proposed Coal Hollow Mine permit area occurs primarily in two areas (Drawing 7-4). In the northwest quarter of Section 29, T39S, R5W, considerable natural discharge from the alluvial groundwater system occurs through springs and seeps (Drawing 7-4; groundwater discharge area A). Minor discharge from several flowing artesian wells also occurs in this area. The artesian alluvial groundwater system in eastern Sink Valley also likely provides recharge to the clayey alluvial sediments in the southwestern portion of the valley in the proposed Coal Hollow Mine permit area. Discharge from the alluvial groundwater system in groundwater discharge area A area results in decreases to the amount of water in storage in the alluvial groundwater system and also decreases in artesian hydraulic pressure in the aquifer.

Appreciable discharge from the alluvial groundwater system also occurs in lower Sink Valley in the northwest quarter of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). Sink Valley constricts markedly in this area, which forces shallow alluvial groundwaters flowing down the valley to discharge at the land surface as springs, seeps, and diffuse discharge to the surface (i.e., there is a significant decrease in the cross-sectional area of the alluvial sediments). Groundwater discharge in

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this area occurs from diffuse seepage to the surface and also as discharges to two springs and several small seeps (Drawing 7-1).

Much of the alluvial groundwater in Sink Valley likely ultimately leaves the valley via evapotranspiration. This conclusion is based on the observation that there is very rarely any discharge of surface water (at least at the surface in the channel) in Sink Valley Wash below Sink Valley (See site SW-9; Drawing 7-2; UDOGM, 2007). The clayey, low-permeability sediments present at the surface over most of Sink Valley also impede appreciable infiltration of precipitation and snowmelt waters into the deeper subsurface. Hence, groundwater recharge to the lower half of the Sink Valley sediments (including the proposed Coal Hollow Mine permit area) likely occurs primarily via horizontal migration of alluvial groundwaters from up-gradient areas.

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Flowing artesian groundwater conditions are also observed in monitoring wells screened near the base of the alluvial sediments in the northwest corner of Section 32 T39S, R5W. It is probable that the artesian alluvial groundwater system in Section 29, T39S, R5W is continuous with that in the northwest corner of Section 32. It should be noted that within the proposed Coal Hollow permit area, artesian conditions were not observed in monitoring wells. While the thickness of the alluvial sediments in the artesian groundwater system east of the proposed Coal Hollow permit area range up to 150 feet thick, the thickness of alluvium overlying areas with mineable coal in the proposed Coal Hollow permit area generally does not exceed about 50 feet and in many locations it is considerably thinner.

Natural discharge of alluvial groundwater in the Robinson Creek drainage area is meager. This condition is largely due to the presence of the elevated ridge of impermeable Tropic Shale bedrock associated with the Sink Valley Fault that dissects and effectively isolates the alluvium east of the fault from that west of the fault (See Drawing 6-1). Because of the low permeability of the Tropic Shale, this condition apparently forces alluvial groundwater east of the Tropic Shale ridge to flow to the south toward Sink Valley that would otherwise report to the Robinson Creek drainage. During high flow conditions in the alluvial groundwater system east of the Tropic Shale ridge, minor amounts of groundwater "overtop" the bedrock ridge and drain via surface flow over the Tropic Shale bedrock, where it either recharges shallow alluvial sediments to the west of the fault or is lost to evapotranspiration. The influence of the Tropic Shale ridge is readily evident in field observations, with marked differences in vegetation and soil moisture being apparent on opposite sides of the ridge. During low-flow conditions, discharge from the overtopping of the bedrock ridge has generally not been observed. Isolated areas of soil wetness and shallow perched alluvial groundwater systems that exist west of the bedrock ridge in the northeast corner of Section 30 and the southeast corner of Section 19, T39S, R5W are likely sourced via this mechanism.

Seepage of alluvial groundwater into the deeply incised lower Robinson Creek stream channel occurs near the contact with the underlying Dakota Formation in the southeast quarter of Section 19, T39S, R5W. This water is likely related to saturated alluvial deposits underlying the Robinson Creek stream channel. The alluvial groundwater

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emerges near where the stream channel intersects the alluvial groundwater system. It is noteworthy that the location of the emergence of alluvial water in the channel has varied somewhat over time. The bank seepage water is likely alluvial groundwater that seeps to the surface where the incised stream channel intersects the potentiometric surface of the alluvial groundwater system. Typically, this is near the contact with the underlying Dakota Formation bedrock in the bottom of the stream channel. Because of the seasonal changes in the elevation of the potentiometric head in the alluvial groundwater system, the location of the bank seepage is variable over time (i.e. the variability in the bank seepage locations are likely controlled primarily by temporal variability in potentiometric levels in the alluvial groundwater system rather than by fixed, permeability-controlled groundwater preferential pathways in the aquifer skeleton). Consequently, the bank seepage locations are not well-defined point sources, but rather dynamic seepage fronts along this general reach of the stream.

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The Robinson Creek stream channel above this location is almost always dry (except for in direct response to torrential precipitation events or during the springtime runoff season during wet years. This seepage of alluvial water in the Lower Robinson Creek channel is typically about 5 to 10 gpm or less and is routinely monitored at monitoring station SW-5 (Drawing 7-2).

Information on water quality for groundwaters and surface-waters has been uploaded into the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007) and is summarized and described in Appendix 7-1.

Appreciable spatial variability exists in water quality in groundwaters and surface waters in the proposed Coal Hollow permit and adjacent area. Stiff diagrams depicting solute compositions and overall water quality for groundwaters and surface waters in the proposed Coal Hollow Mine permit and adjacent area are shown in Appendix 7-1. Important water quality characteristics for groundwaters are summarized below.

Groundwater Source	Chemical type	TDS (mg/L)
Alluvial groundwaters, coarse-grained system east of proposed permit area	Calcium-magnesium-bicarbonate	380 mg/L to 500 mg/L typically, Little seasonal variability
Alluvial groundwaters in south sink valley	Variable, magnesium-bicarbonate sulfate, calcium-magnesium-bicarbonate	450 mg/L to 3,600 typically, Highly variable based on season and climate for shallow systems, less variability in deeper system
Dakota Formation, fault groundwater system south of proposed permit area	Sodium-bicarbonate	500 mg/L to 600 mg/L typically, Little seasonal variability

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It is apparent that the overall water quality of alluvial groundwater degrades from the mountain-front recharge water to the artesian groundwater system east of the proposed Coal Hollow permit area to the non-artesian shallow alluvial groundwater systems located in the more distal portions of Sink Valley. These changes are due to groundwater interaction with soluble minerals in the primarily Tropic Shale-derived sediments that make up the shallow alluvial materials in the proposed permit area.

This down-gradient degradation in water quality is shown graphically on Drawing 7-5. In Drawing 7-5, the average specific conductance values in µS/cm for representative springs and seeps in the Sink Valley drainage are plotted on the map as circles with the circle areas being proportional to the specific conductance average for the spring or seep. The specific conductance information used in generating Drawing 7-5 has been submitted electronically to the Division's hydrology database (UDOGM, 2007). It is readily apparent from Drawing 7-5 that the specific conductance (which is a reflection of the dissolved solids concentration) is degraded from the mountain-front recharge water (represented by stream SW-8) to the artesian alluvial groundwater system in the northwest quarter of Section 29, T5W, R39S, to the alluvial groundwaters in the southern portion of Sink Valley below the Coal Hollow Mine permit area.

Specific conductance values were used for plotting in Drawing 7-5 because specific conductance values are available for all springs and seeps, while laboratory chemical analyses are available for only some of the springs and seeps. Stiff (1951) diagrams for selected springs along this geochemical evolutionary pathway are shown on Figure 14 of Appendix 7-1. It is apparent from the Stiff diagrams and from geochemical information submitted to the Division (UDOGM, 2007) that the mountain-front recharge water (represented by monitoring site SW-8 in upper Swapp Hollow) is of the calcium-magnesium-bicarbonate chemical type with an average TDS concentration of 333 mg/L. Groundwater downgradient of the mountain-front recharge areas in the artesian alluvial groundwater system in Section 29, T5W, R39S, is also of the calcium-magnesium-bicarbonate chemical type, with an average TDS concentration at artesian well Y-61 of 400 mg/L. Further downgradient in the artesian alluvial groundwater system in Section 29, the geochemical composition at SP-8 is of the calcium-magnesium-bicarbonate chemical type with a somewhat increased TDS concentration of 425 mg/L. In the lower portions of Sink Valley in Section 32, T5W, R39S, the chemical quality of the alluvial groundwater is appreciably degraded relative to that in the upper portions of the groundwater system. At spring SP-6, the composition of the alluvial groundwater is seasonally variable and is of the magnesium-bicarbonate-sulfate, or calcium-magnesium-bicarbonate-sulfate chemical type. The TDS concentrations at SP-6 average 970 mg/L. The chemical composition of alluvial groundwater at SP-33 is of a geochemical type similar to that at SP-6, although TDS concentrations are somewhat lower, averaging 795 mg/L. The spatial variability apparent in the TDS concentrations in the alluvial groundwater in Section 32 is likely related to flushing effects resulting from higher groundwater fluxes through zones of increased permeability in the alluvium. It is noteworthy that groundwater in the gravelly zones in the deeper alluvial east of the

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permit area in Section 32 monitored at the 85-foot deep well LS-85 is considerably lower in TDS concentration with an average of 457 mg/L. The lower TDS concentrations of artesian alluvial groundwater in the deeper, coarser-grained portions of the alluvium are likely attributable to the isolation of these groundwaters from the shallow, clayey, Tropic Shale derived alluvial sediment in the near-surface alluvial groundwaters.

The appreciable temporal variability in the solute geochemical compositions of the shallow alluvial groundwaters in Section 32 is likely attributable to seasonal and climatic variability in the groundwater flux rate through these systems and corresponding variability in rock/water ratios and residence time in the evaporate mineral rich Tropic Shale derived shallow alluvial sediments present in this portion of Sink Valley. Alluvial groundwaters in the deeper portions of Sink Valley to the east in Section 32 are part of a larger, more continuous groundwater system that is hydraulically isolated from overlying shallow recharge sources, and consequently have not exhibited similar temporal variability in solute geochemical composition.

Surface Water Resources

Surface water resources in the proposed Coal Hollow Mine permit and adjacent area are described in Appendix 7-1 and are summarized below.

Surface waters in the proposed Coal Hollow Mine permit and adjacent area are tributary to Kanab Creek. Surface waters in the northern portion of the proposed permit and adjacent area drain into the Robinson Creek and upper Kanab Creek drainages. Surface waters in the southern portion of the proposed permit and adjacent area drain into the Sink Valley Wash drainage which is tributary to Kanab Creek about 6 miles below the proposed Coal Hollow Mine permit area. Surface water drainages in the permit and surrounding areas are shown in Appendix 7-1. Surface water baseline monitoring stations are shown on Drawing 7-2. Locations of surface-water water rights in and adjacent to the proposed Coal Hollow Mine permit and adjacent area are shown on Drawing 7-3. Water rights data from the proposed Coal Hollow Mine permit and adjacent area are detailed in Appendix 7-3.

Information on water quality for groundwaters and surface-waters has been uploaded into the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007) and is summarized and described in Appendix 7-1.

Surface waters in Kanab Creek are used for stock watering and crop irrigation in the irrigable lands adjacent to Kanab Creek west of the proposed Coal Hollow Mine permit area. Discharge in Kanab Creek measured near the town of Alton (SW-1) is seasonally dependent and largely influenced by upstream water use. Discharge in Kanab Creek monitored at SW-1 typically ranges from 10 cfs or less during the springtime runoff period to 1 cfs or less during the summertime.

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Discharge in Lower Robinson Creek drainage is meager. Other than during the springtime runoff event in wet years or during torrential precipitation events, flow has not been observed at monitoring stations SW-4 and SW-101 (Drawing 7-2). Discharge at the lower monitoring site on Lower Robinson Creek (SW-5; Drawing 7-2) is meager. The small discharge occasionally present at SW-5 is derived from the seepage of alluvial groundwater into the Lower Robinson Creek stream channel between monitoring sites SW-101 and SW-5

Tributaries to the Sink Valley Wash drainage in the proposed Coal Hollow Mine permit and adjacent areas include (from north to south) Water Canyon, an unnamed drainage south of Water Canyon in Section 21 T39S, R5W, and Swapp Hollow. Discharge rates in these drainages are highly seasonally dependent (UDOGM, 2007; Appendix 7-1). Discharges in the Water Canyon and Swapp Hollow drainages are intermittent or perennial in nature with discharge peaks occurring during the springtime runoff season and much lower flows occurring during the late summer and fall months. Discharge in the unnamed drainage in Section 21 T39S, R5W is ephemeral.

The water quality and discharge characteristics of surface waters in the proposed Coal Hollow Mine permit and adjacent area are presented in UDOGM (2007) and described in Appendix 7-1. Solute compositions of stream waters are also depicted graphically as Stiff diagrams in Appendix 7-1. The solute compositions of surface waters in the proposed Coal Hollow Mine permit and adjacent area are summarized below.

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Source	Chemical type	TDS (mg/L)
Robinson Creek/Dry Fork	Calcium-magnesium-bicarbonate	300 mg/L typical
Lower Robinson Creek	Variable, magnesium-sulfate-bicarbonate	300 – 3,000 mg/L typical, dependent on discharge
Swapp Hollow	Calcium-magnesium-bicarbonate	250-350 mg/L typical
Kanab Creek	Magnesium-calcium-bicarbonate-sulfate during high flow, variable during low-flow, variability likely due largely to interaction with Tropic Shale soils and irrigation return flows	500-1,300 mg/L typical, Variable dependent on season and irrigation use
Sink Valley Wash	Magnesium-calcium-bicarbonate	600 -1,500 mg/L typical, variable dependent on discharge

Considerable seasonal variability exists in the solute compositions of stream waters in Kanab Creek in the proposed Coal Hollow Mine permit and adjacent area (UDOGM, 2007; Appendix 7-1). During low-flow conditions, interactions between stream waters and Tropic Shale or Tropic Shale-derived alluvial sediments likely result in increased TDS concentrations. Return flow from irrigated fields and interactions with soils rich in soluble minerals also likely contribute to increased TDS concentrations in the summertime. During the spring runoff season, high surface-water flows that originate from the adjacent upland areas dominate the flow in the channel. The TDS concentrations of Kanab Creek waters during high-flow conditions are thus lower than during the low-flow season. Much less seasonal variability in solute content in surface water flows from the mountain stream in Swapp Hollow (UDOGM, 2007; Appendix 7-1). This condition is likely attributable to the fact that the stream in Swapp Hollow, which originates on geologic formations overlying the Tropic Shale, has considerably less contact with the Tropic Shale than does Kanab Creek. Additionally, there are no known irrigation diversions or returns above the stream monitoring point (SW-8; Drawing 7-2) in Swapp Hollow.

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722 CROSS SECTIONS AND MAPS

722.100 A map showing the locations of springs and seeps in the proposed Coal Hollow Mine permit and adjacent area is presented in Drawing 7-1. A map showing potentiometric levels in alluvial groundwater systems in the proposed Coal Hollow and adjacent areas is presented in Drawing 7-13. It is important to note that the alluvial groundwater potentiometric contours depicted in Drawing 7-2 are not representative of a laterally or vertically continuous groundwater system. Within the proposed Coal Hollow Mine permit and adjacent area, appreciable portions of the alluvial sediments are not saturated. Additionally, perched groundwater conditions are present in many locations in the alluvium in the area. In other words, the alluvial groundwater systems in the proposed Coal Hollow Mine permit and adjacent area are not a single, interconnected aquifer. Rather, there exist several areas of saturated alluvium, which may or may not be in good hydraulic communication with adjacent areas. Consequently, it is not possible or meaningful to construct a true potentiometric contour map in the strict sense. Consequently, it is not appropriate to evaluate regional potentiometric trends over large distances or to infer precise groundwater flow directions or hydraulic gradients in the alluvial groundwater system based on Drawing 7-2. The alluvial groundwater system potentiometric map presented in Drawing 7-2 is useful for evaluating approximate local potentiometric conditions general saturation trends.

722.200 Location of surface water bodies
Within the proposed Coal Hollow Mine permit and adjacent area, no significant natural ponds or lakes occur. The locations of springs and streams are shown in Drawing 7-1. Many small earthen impoundments and ponds have been created to store surface-water runoff and spring discharge water for stock watering and irrigation use. The locations of ponds and associated conveyance ditches are shown on Drawing 7-7.

722.300 Baseline monitoring stations
Baseline monitoring stations are shown on Drawing 7- 2. A map showing the locations of monitoring wells in the proposed Coal Hollow permit and adjacent area is presented in Drawing 7-12 and on Figure 12 of Appendix 7-1. Drawings 7-2 and 7-12 also show monitoring stations from which baseline hydrologic data were collected in previous studies. Monitoring station locations, elevations, and other details are presented in Table 7-1.

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722.400 Location of water wells

Water well locations are shown in Drawing 7-2 and Drawing 7-12. Well construction details and locations are presented in Table 7-2.

722.500 Contour map(s) of disturbed area(s)

Surface contours representing the existing land surface configuration of the proposed permit area (including potentially disturbed areas) are shown on Drawing 5-1 and the post mining land configuration is shown on 5-35. Cross sections with both these landforms are shown on Drawing 5-36. The premining landform, with exception of the Facilities area and Lower Robinson Creek, are from an aerial flight that was limited to a five foot contour interval. Therefore, contours have been interpolated down to a 2 foot level using the available aerial flight information. This interpolation provides accuracy for the Division to make the necessary determinations. The Facilities area and portions of Lower Robinson Creek are actual survey data to the accuracy of 2 foot contours.

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723 SAMPLING AND ANALYSIS

Water quality sampling and analyses have been and will be conducted according to the "Standard Methods for the Examination of Water and Wastewater" or EPA methods listed in 40 CFR Parts 136 and 434. Information regarding laboratory analytical methods utilized in performing water quality analyses at the analytical laboratories has been submitted to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007).

724 BASELINE INFORMATION

Baseline groundwater, surface-water, geologic, and climatologic data are described in Appendix 7-1 and summarized below.

724.100 Groundwater Information

The location of wells and springs in the proposed Coal Hollow Mine permit and adjacent area are shown on Drawings 7-1 (Spring and seep survey map), 7-2 (Baseline monitoring locations), and 7-12 (Monitoring well location map). Groundwater rights in and around the proposed Coal Hollow Mine permit area are shown on Drawing 7-3 and tabulated in Appendix 7-3.

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Seasonal quality and quantity of groundwater and usage is presented in Appendix 7-1 and UDOGM (2007). Baseline discharge and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality (UDOGM, 2007).

Baseline monitoring of groundwater resources in and around the proposed Coal Hollow permit area have been carried out by several entities. Previous hydrologic studies of the region have been made in the Alton Coal Field area by Goode (1964, 1966), Sandberg (1979), Cordova (1981), and Plantz (1983). Selected hydrologic data collected in conjunction with these studies have been incorporated into the hydrologic analysis and baseline data included in this permit application.

During the 1980's, extensive monitoring of groundwater resources in the proposed permit and surrounding areas was performed by Utah International, Inc. Utah International Inc.'s groundwater monitoring activities included the construction of numerous groundwater monitoring wells, aquifer testing activities, and the performance of discharge, water level, and field and laboratory water quality monitoring of springs, seeps, and wells. These baseline monitoring activities were performed as part of a proposed coal mine permitting action in the Alton Coal Field. Ultimately, the proposed coal mining action did not proceed. Relevant monitoring information from the Utah International, Inc. baseline monitoring activities have been included as supplemental baseline data included in this permit application.

Commencing in the 2nd quarter of 2005, regular quarterly baseline monitoring of groundwater resources has been commissioned by Alton Coal Development, LLC. Baseline monitoring of springs, seeps, and groundwater wells in and around the proposed Coal Hollow Mine permit area have been routinely performed. Data collected in the baseline monitoring activities have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007).

Baseline potentiometric information from wells has been input into the DOGM database. For non-flowing-artesian wells, this information has been input in a depth-to-water-relative-to-the-top-of-the-well-casing format using units of feet. For wells experiencing flowing artesian conditions, the potentiometric data are reported to the database in feet as a height-of-the-potentiometric-surface-above-the-top-of-the-well-casing format expressed as a negative number (which makes the flowing-artesian and non-flowing-artesian potentiometric measurements directly comparable). For both conditions, the reported measurements can be directly converted to an absolute water elevation by subtracting the reported value from the elevation of the top of the well casing.

The potentiometric head in monitoring wells experiencing flowing-artesian conditions is measured either 1) by temporarily extending the height of the well casing and allowing the water level to stabilize and the performing a height of the water column measurement (where the artesian pressure is small), or 2) by using a pressure gauge to measure the shut-in artesian pressure in the well and then converting that number to an equivalent height in feet.

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During December 2006 and January 2007 an extensive drilling and monitoring well construction program was implemented. This hydrogeologic program included the installation of 30 groundwater monitoring wells in and adjacent to the proposed Coal Hollow Mine permit area. The focus of the drilling program was to characterize the stratigraphy and hydrogeologic properties of alluvial groundwater systems in and adjacent to proposed mining areas. Aquifer characterization of the alluvial groundwater system was also performed using pump testing and slug testing techniques. Investigative methods utilized and the results of the analysis of the data are described in Appendix 7-1.

724.200 Surface Water Information

The locations of streams, stock watering ponds, and conveyance ditches in the proposed Coal Hollow Mine permit and adjacent area are shown on Drawing 7-7. Surface-water rights in and adjacent to the proposed Coal Hollow Mine permit area are shown on Drawing 7-3 and tabulated in Appendix 7-3. Surface-water discharge rates and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality Database (UDOGM, 2007). Additional surface-water information is provided in Appendix 7-1.

It is not anticipated currently that discharge from the proposed Coal Hollow Mine will be necessary. Where necessary, alluvial groundwater that may be intercepted by mining will be placed in drains and diverted away from disturbed areas and discharged (i.e., as groundwater dewatering). However, a Utah UPDES discharge permit will be obtained so that if discharge of mine water becomes necessary, it can be discharged in accordance with the UPDES discharge permit. The exact locations of mine water discharge points will be established upon issuance of the UPDES discharge permit. Any mine discharge water will be placed in either the Lower Robinson Creek drainage or the Sink Valley Wash drainage. Both of these drainages are tributary to Kanab Creek.

As described in R645-301-728.320, acid drainage is not expected from the proposed mining operation. This is due to the pervasiveness of carbonate minerals in the mine environment that will neutralize any acid produced.

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Seasonal quality and quantity of groundwater and usage is described herein and in Appendix 7-1. Baseline discharge and water quality data have been submitted electronically to the Utah Division of Oil, Gas and Mining, Utah Coal Mining Water Quality (UDOGM, 2007).

Baseline monitoring of surface-water resources in and around the proposed Coal Hollow permit area have been carried out by several entities. Previous hydrologic studies of the have been made in the Alton Coal Field area by Goode (1964, 1966), Sandberg (1979), Cordova (1981), and Plantz (1983). Selected hydrologic data collected in conjunction

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with these studies have been incorporated into the baseline data as part of this permit application.

During the 1980's, extensive monitoring of surface water resources in the proposed permit and surrounding areas was performed by Utah International, Inc. Utah International Inc.'s groundwater monitoring activities included the operation of continuous recording stations on selected streams, and the performance of routine surface-water discharge measurements and field and laboratory water quality analyses. These baseline monitoring activities were performed as part of a proposed coal mine permitting action in the Alton Coal Field. Ultimately, the proposed coal mining action did not proceed. Relevant monitoring information from the Utah International, Inc. baseline monitoring activities have been included as supplemental baseline data as part of this permit application.

Commencing in the 2nd quarter of 2005, regular quarterly baseline monitoring of surface-water resources has been commissioned by Alton Coal Development, LLC. Baseline monitoring of surface-waters in and around the proposed Coal Hollow permit area, including surface-water discharge measurements and field and laboratory water quality analyses, have been routinely performed.

All surface waters in the proposed Coal Hollow Mine permit and adjacent area are tributary to the Kanab Creek drainage. Surface-water monitoring stations from which baseline data have been collected are shown on Drawing 7-2 and include the following:

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Sink Valley Wash drainage

SW-8 (Swapp Hollow above proposed mining areas), SW-7 (unnamed drainage in Section 21, T39S, R5W), RID-1 (irrigation diversion of water from Water Canyon drainage above proposed mining areas), SW-6 (headwaters of unnamed tributary to lower Sink Valley Wash), and SW-9 (Sink Valley Wash below proposed mining areas).

Lower Robinson Creek drainage

SW-4 (Robinson Creek above proposed mining areas), SW-101 (Lower Robinson Creek near proposed mining areas), and SW-5 (Lower Robinson Creek below proposed mining areas).

Kanab Creek drainage

SW-1 (Kanab Creek near Alton, Utah; above proposed mining areas), SW-3 (Kanab Creek above proposed mining areas), and SW-2 (Kanab Creek below Lower Robinson Creek and below proposed mining areas)..

724.300 Geologic Information

Geologic information in sufficient detail to determine the probable hydrologic consequences of mining and determine whether reclamation as required by R645 can be accomplished is given in Chapter 6 of this permit application package and in Appendix 7-1.

724.400 Climatological Information

Climatological information, including temperature and precipitation data, have been routinely measured and recorded at the Alton, Utah weather station (420086) since 1928. The station is located in the town of Alton, approximately two miles north of the proposed Coal Hollow Mine permit area. Climatological data collected at the Alton station for the 77 year period from 1928 to 2005 are summarized in Table 7-3. Climatological data from the proposed Coal Hollow Mine permit and adjacent area are plotted in Drawing 7-8.

An automated weather station was installed in the proposed Coal Hollow Mine permit area in December 2005. The station is configured to continuously monitor and record temperature, wind velocity, and wind direction data. The station is also configured to continuously measure and record precipitation, although the tipping rain-gauge is not operative during winter months. Climate data from the proposed Coal Hollow Mine and adjacent area are also presented in Appendix 7-6.

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724.411 Seasonal precipitation

Precipitation data from the Alton, Utah weather station indicates average annual precipitation of 16.38 inches per year. Doelling (1972) reports average annual precipitation in the Alton Coal Field area ranging from 9 to 20 inches annually with slightly higher increments likely in the higher parts of the plateau (Doelling, 1972). There are generally two annual wet periods in the region. During the wintertime, cyclonic storms bring precipitation (mainly snowfall) to the region. During the summertime, storms originating from convection of air from the Gulf of Mexico or the Pacific Ocean bring rains to the region. Of the two annual wet cycles, the summer rainfall is most reliable. Average monthly precipitation at the Alton station ranges from a low of 0.57 inches in June to a maximum of 1.80 inches in February. Daily temperature and precipitation data recorded at the Coal Hollow Project weather station during 2006 and early 2007 are presented in Appendix 7-6.

The Palmer Hydrologic Drought Index (PHDI; NCDC, 1997) indicates long-term climatic trends for the region. The PHDI is a monthly value generated by the National Climatic Data Center (NCDC) that indicates the severity of a wet or dry spell. The PHDI is computed from climatic and hydrologic parameters such as temperature, precipitation, evapotranspiration, soil water recharge, soil water loss, and runoff. Because the PHDI takes into account parameters that affect the balance between moisture supply and moisture demand, the index is a useful for evaluating the long-term relationship between climate and groundwater recharge and discharge. A plot of the PHDI for Utah Region 4 (which includes the proposed Coal Hollow Mine permit and surrounding area) is shown in Drawing 7-9. It is apparent in Drawing 7-9 that the region has experienced cyclical periods of drought and wetness since 1980. Baseline hydrologic monitoring performed by Utah International, Inc in 1987 and 1988 occurred during a period of near normal wetness. Recent baseline hydrologic monitoring conducted in 2005 and 2006 occurred during a period of moderate to severe wetness, with 2005 being wetter than 2006.

724.412 Wind direction and velocity

Wind data have been collected at the Coal Hollow Project weather station since December 2005. Monthly wind data from the Coal Hollow Project weather station are available from January 2006 through March 2006, and from November 2006 through May 2007. Monthly wind data are plotted as wind rose diagrams, which depict the average direction and velocity of prevailing winds, in Appendix 7-1. Based on recent data from the Coal Hollow Project weather station, it is apparent that the predominant wind direction in the proposed Coal Hollow Mine permit area (during the months for which data are available) are from the northeast, with secondary peaks from the north and south-southwest (Appendix 7-1). Surface winds recorded at the Coal Hollow Project weather station averaged about 6.4 miles per hour. Tabulated hourly wind data from the

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Coal Hollow Project weather station are maintained on file at Alton Coal Development, LLC.

Wind data have also been collected historically at nearby locations by governmental and other entities. The regionally predominant direction of winds in the region is southwest through west. Secondary peaks are from southeast and northwest. Surface winds in the area average approximately 8 miles per hour. Higher wind speeds are associated with fronts and storms and generally occur during the springtime.

724.413 Seasonal temperature ranges

Temperature data from the region are summarized in Table 7-3. Temperatures in the permit area vary greatly. Temperature data from the Alton station (1928-2005) indicate that monthly average low temperatures are below freezing for the 6-month period from November to April. Monthly average minimum temperatures range from a low of 15.1 °F during January to a high of 49.8 °F in July. Monthly average maximum temperatures range from a low of 39.5 °F in January to a high of 82.6 °F in July. Daily maximum and minimum temperature data collected at the Coal Hollow Project weather station during 2006 and the first quarter of 2007 are presented in Appendix 7-6 and plotted in Drawing 7-8. The maximum temperature recorded during this period was 93.3 °F in July 2006. The minimum temperature recorded during this period was -7.3 °F in January 2007.

724.500 Supplemental Information

Other than the possible short-term diminution in discharge rates from alluvial groundwater systems, including the potential short-term diminution of discharge rates from some springs and seeps in Sink Valley, adverse impacts to the hydrologic balance, either on or off the permit area are not expected to occur. It is not anticipated that acid- and toxic-forming materials will cause significant contamination of groundwater or surface-water supplies. Any discharges of mine waters to surface-water systems will be regulated under and meet the criteria of a UPDES discharge permit. The mining and reclamation plan has been designed to minimize the potential for disturbance or disruption of the hydrologic balance and to protect groundwater and surface-water resources in the area.

If substantial alluvial groundwater inflows into mining areas occur as mining progresses in close proximity to alluvial springs and seeps in the eastern ¼ of Section 30, T39S, R5W and the northwest ¼ of Section 29, T39S, R5W or in close proximity to coarse-grained alluvial sediments in the artesian groundwater system along the eastern side of Sink Valley, Alton Coal Development, LLC will evaluate hydrogeologic conditions at the time such may occur. It should be noted that very large discharges into mine workings are not anticipated based on the results of recent drilling and aquifer testing performed in these areas (see Appendix 7-1). Based on the hydrogeologic conditions encountered, where necessary Alton Coal Development, LLC will use a suitable technique to minimize

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groundwater inflow rates into the mine, which may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to protect groundwater resources up-gradient of mining activities. The potential for success of such protective measures in minimizing drainage of alluvial deposits up-gradient of proposed mining areas is believed to be good, given that the thickness of the alluvium in these areas is generally on the order of about 20 to 50 feet and these sediments are directly underlain by essentially impermeable Tropic Shale in proposed mining areas. It is important to note that while temporary impacts to groundwater discharge rates from alluvial springs and seeps could possibly occur, these impacts will likely be short-lived. This conclusion is based on the fact that individual mine pits in most instances will remain open for no more than about 60 to 120 days. After mine pits are backfilled and reclaimed, the potential for appreciable continued drainage of up-gradient alluvial groundwater through the backfilled pits in that area is low. When mining is complete in an area, seasonal recharge to alluvial groundwater systems will gradually replenish groundwater to the alluvial groundwater system. Large-scale dewatering of the alluvial groundwater system, such that appreciable compaction of the aquifer skeleton could occur, is not anticipated (see Appendix 7-1).

If diminution of discharge rates from seeps and springs does occur as a consequence of mining and reclamation activities, any lost water will be replaced according to all applicable Utah State laws and regulations using the water replacement source specified in R645-301-727. The quantity and quality of replacement water detailed in R645-301-727 will be suitable for the existing premining uses and approved postmining land uses.

It should be noted that the proposed Coal Hollow Mine plan calls for the permanent diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of groundwater or surface-water resources, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

If excess groundwater were to be encountered during mining operations such that it could not be adequately managed or discharged in compliance with the Utah UPDES discharge permit (which is considered unlikely), Alton Coal Development, LLC may when necessary and with the approval of the Utah Division of Oil, Gas and Mining construct supplemental containment and settlement ponds in which mine discharge waters may be held for treatment (where necessary) and subsequent discharge through UPDES discharge points in compliance with the UPDES discharge permit.

724.700 Alluvial Valley Floor Determination

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Not applicable¶
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A field investigation has been performed in the proposed Coal Hollow Mine permit and adjacent area to provide to the Division the information required to make an evaluation

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regarding the existence of a probable alluvial valley floor in the proposed Coal Hollow Mine permit and adjacent area. The results of this field investigation and related information is provided in Appendix 7-1. Additional information regarding potential alluvial valley floors in the area is provided in Appendix 7-7.

A report detailing the findings of a previous field investigation performed by Water Engineering & Technology, Inc., entitled "Geomorphological and sedimentological characteristics of Sink Valley, Kane County, Utah" is included as Appendix 7-4.

725 BASELINE CUMULATIVE IMPACT AREA INFORMATION

Appendix 7-1 contains the results of a comprehensive investigation of groundwater and surface-water systems in the proposed Coal Hollow Mine permit and adjacent area. Appendix 7-1 also includes information regarding the probable hydrologic consequences of coal mining in the proposed Coal Hollow Mine permit area and recommendations for hydrologic monitoring. Appendix 7-1 also includes the results of a field investigation performed in the proposed Coal Hollow Mine permit and adjacent area to provide to the Division of Oil, Gas and Mining the information required to make an evaluation regarding the existence of a probable alluvial valley floor in the proposed Coal Hollow Mine permit and adjacent area. This Information together with the information submitted herein can be used to assess the probable cumulative hydrologic impacts of coal mining and reclamation operations in the proposed Coal Hollow Mine permit and adjacent area as required by R645-301-729.

R645-301-726 Modeling

No numerical models have been created for the permit area nor are any planned.

727 ALTERNATIVE WATER SOURCE INFORMATION

This section provides information on the alternative water source that will be used to replace water from groundwaters or surface waters should they be impacted by mining and reclamation activities in the proposed Coal Hollow Mine permit and adjacent area. The alternative water source is a water production well planned for construction on private land leased by Alton Coal Development, LLC in the northwest quarter of Section 29, Township 39 South, Range 5 West. The planned location for the well, which is situated within the proposed Coal Hollow Mine permit area, is shown on Drawing 5-8C. The well will produce water from the alluvial groundwater system in Sink Valley in locations up-gradient of proposed mining operations. Based on aquifer testing performed in the alluvial groundwater system near the proposed water well (using the existing well Y-61 as a pump testing well), it is believed that adequate water can be produced from the new well to satisfy the potential water replacement needs of the mine. Details of the

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Deleted: is screened in the Sink Valley artesian alluvial groundwater system in strata comprised chiefly of gravels and coarse sands. The

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aquifer testing and information on the hydrogeologic characteristics of the Sink Valley alluvial groundwater system are presented in Appendix 7-1.

Water quality data from the Sink Valley alluvial groundwater system near the location of the proposed new water well have been collected from well Y-102 and have been submitted electronically to the Utah Division of Oil, Gas and Mining Utah Coal Mining Water Quality Database (UDOGM, 2007). It is anticipated that the quantity and quality of water produced from the new water production well will be suitable for the existing premining uses and approved postmining land uses.

It should be noted that the proposed water replacement well source will produce water from the coarse-grained alluvial groundwater system in Sink Valley. Nearby springs that could potentially be impacted by mining and reclamation activities are supported by the same alluvial groundwater system. However, while modest decreases in the artesian hydraulic pressures in the alluvial groundwater system could potentially result in diminution of spring flows, the planned new water well will likely be approximately 100 feet deep and will be equipped with an electric well pump giving it the capacity to produce groundwater from the alluvial system even if the hydraulic head in the area were to be diminished such that artesian flow conditions temporarily ceased to exist.

An analysis of the total average discharge of state appropriated groundwaters from the permit and adjacent area has been performed to determine whether the quantity of water that could likely be produced from the new water replacement well will be adequate for potential replacement needs. Based on baseline spring discharge data submitted to the Division (UDOGM, 2007), it is determined that the average discharge of all state appropriated groundwater from groundwater discharge area A (Drawing 7-3, Drawing 7-4) is approximately 35 gpm. The state appropriated waters in groundwater discharge Area A include most of the significant springs in the area and essentially all of the largest springs in the area (Drawing 7-3; Appendix 7-3). The average discharge of all state appropriated groundwater from groundwater discharge area B (Drawing 7-4) is approximately 17 gpm. Using an unlikely worst-case scenario and assuming that all springs with state appropriated waters in both Areas A and B were to cease flowing, a total replacement of approximately 52 gpm would be required. The proposed new water well located in Section 29, Township 39 South, Range 5 West will be designed to produce water at that quantity and, therefore, should be able to provide adequate replacement water in even this worst-case scenario (which is not considered likely). Aquifer analysis described in Appendix 7-1 suggests that the yield of the alluvial groundwater system in which the new water well will be constructed should be capable of sustaining discharges of the required magnitude and for the lengths of time that the need for replacement water would be likely. It should be noted that if the need arises to provide replacement water for impacted state appropriated waters, the duration of the need will likely be of a relatively short duration (see Section 728 below).

Alton Coal Development, LLC has entered into a written agreement with the town of Alton, Utah to transfer the point of diversion for 50 acre-feet of water for use at the Coal Hollow Mine. A copy of this agreement is included in Appendix 7-8 (in confidential

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binder). This water will be available for all uses at the mine including potential use for water replacement. The planned new water well will be constructed on lands currently leased by Alton Coal Development, LLC. Consequently, no new landowner access agreement will be required for the drilling of the well.

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728 PROBABLE HYDROLOGIC CONSEQUENCES (PHC) DETERMINATION

This section describes the probable hydrologic consequences of surface coal mining in the proposed Coal Hollow Mine permit area. This determination is based on data presented herein and on information provided in Appendix 7-1. This mining and reclamation plan has been designed to minimize potential adverse impacts to the hydrologic balance. It should be noted that this PHC and also Appendix 7-1 may be updated periodically as required as additional hydrogeologic information and mining data become available in the future.

728.310 Potential adverse impacts to the hydrologic balance

Other than the possible short-term diminution in discharge rates from alluvial groundwater systems, including the potential short-term diminution of discharge rates from some springs and seeps in Sink Valley, appreciable adverse impacts to the hydrologic balance, either on or off the permit area are not expected to occur. The basis for this determination is discussed below.

As discussed in Section 721 above, minimal groundwater resources exist in the Tropic Shale, which directly overlies the coal reserves in proposed mining areas. Groundwater in the Tropic Shale does not provide measurable baseflow discharge to streams in the area. The lack of appreciable groundwater flow in the Tropic Shale is a result of the poor water transmitting properties of the marine shale unit. Consequently, it is anticipated that little groundwater will be encountered in the Tropic Shale in mining areas. Thus, the potential for adverse impacts to the hydrologic balance resulting from mining through the Tropic Shale in the proposed Coal Hollow Mine permit area is minimal.

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Similarly, as described in Section 722 above, groundwater resources in the Dakota Formation underlying the coal seam to be mined are not appreciable. This condition is fundamentally a result of the heterogeneity of the rock strata in the Dakota Formation which impedes the ability of the formation to transmit groundwaters significant distances vertically or horizontally. The presence of the essentially impermeable Tropic Shale on top of the Dakota Formation also minimizes the potential for vertical recharge to the Dakota Formation. Mining operations will remove the overlying Tropic Shale rock strata from the Dakota Formation in addition to the Smirl coal seam deposit at the top of the Dakota Formation in mined areas. However, because the pre-mining hydraulic communication between the Tropic Shale and the underlying Dakota Formation in planned mining areas is believed to be minimal, the removal of the Tropic Shale overburden and Smirl coal seam from the Dakota Formation, followed by the rapid backfilling of pit areas with low-permeability fill materials should not result in adverse impacts to the hydrologic balance in the Dakota Formation (i.e., the post-mining degree

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of hydraulic communication between the Dakota Formation and the overlying low-permeability backfill material will be similar to that of the pre-mined condition).

It should be noted that the first water-bearing strata underlying the coal seam to be mined in the proposed Coal Hollow Mine permit area from which appreciable quantities of groundwater can be produced is the Navajo Sandstone. The Navajo Sandstone aquifer is of regional significance in that it provides groundwater of good quality to domestic, agricultural, and municipal wells regionally and provides baseflow to springs and streams. The Navajo Sandstone does not crop out in the proposed Coal Hollow Mine permit and adjacent area. The formation is effectively isolated from proposed mining areas by more than 1,000 feet of rock strata of the Dakota and Carmel Formations (which includes large thicknesses of low-permeability shales and siltstones). The Navajo Sandstone aquifer will not be impacted by proposed mining operations. It should be noted that some previously proposed mining operations in the Alton Coal Field have proposed drilling and pumping of large amounts of groundwater from high-capacity production wells in the Navajo Sandstone aquifer for operational use. No such wells are planned in the proposed Coal Hollow Mine permit and adjacent area.

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Of primary importance to the hydrologic balance in the proposed Coal Hollow Mine permit and adjacent area are alluvial groundwater systems. As discussed in Section 722 and in Appendix 7-1, alluvial groundwater systems in the area support springs, seeps, diffuse groundwater discharge, and a limited number of wells. The bulk of the alluvial groundwater flux through the area occurs in alluvial sediments that include coarse-grained and finer-grained sediments near the eastern margins of Sink Valley, east of the proposed Coal Hollow Mine permit area. Lesser quantities of alluvial groundwater migrate through finer-grained alluvial sediments (predominantly clays, silts, and sands) in the western portions of Sink Valley and in the Lower Robinson Creek drainage within the proposed Coal Hollow Mine permit area. Discharges from alluvial groundwater systems in Sink Valley do not contribute measurable quantities of baseflow to streams (at least at the surface in the stream channel). Alluvial groundwater systems in the Lower Robinson Creek area are much less extensive than the alluvial groundwater systems in Sink Valley. Other than the emergence of small quantities of alluvial groundwater from the stream banks where the stream channel intersects the alluvial groundwater system, discharge from the alluvial groundwater system as springs or seeps in Lower Robinson Creek is generally not observed. Perched groundwater conditions exist locally in the alluvial groundwater system in the Lower Robinson Creek drainage.

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In the general sense, surface coal mining activities in the proposed Coal Hollow Mine permit area have the potential to impact groundwater systems primarily through three mechanisms:

1) Where water-bearing strata in proposed mining areas are mined through, groundwater systems within these strata will obviously be directly intercepted,
2) Where groundwater flow paths through mine openings are interrupted, groundwater flow in down-gradient areas could be diminished, and

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3) Where mine openings intercept permeable strata, groundwater resources in up-gradient areas could potentially be diminished if appreciable quantities of groundwater were to be drained from up-gradient areas.

The potential for the occurrence of each of these potential impacts are described in the following.

Direct Interception of Groundwater Resources

As discussed above, groundwater resources in the relatively impermeable Tropic Shale in the proposed permit area are meager. Consequently, it is improbable that direct interception of appreciable groundwater in the Tropic Shale will occur. Additionally, because Tropic Shale groundwater systems generally do not support discharges to springs or provide baseflow to streams, the potential interception of limited quantities of groundwater in the Tropic Shale will not adversely impact the hydrologic balance. Similarly, groundwater resources in the Dakota Formation (including within the Smirl coal seam) are meager. While the Smirl coal seam will be extracted through mining operations, the underlying strata of the Dakota Formation will not be disturbed. Consequently, adverse impacts to groundwater systems in the Dakota Formation through direct interception of groundwater resources are not anticipated.

Alluvial groundwater systems in planned mining areas in the proposed Coal Hollow Mine permit area will be directly intercepted by the mine openings. It is not anticipated that the direct interception of shallow alluvial groundwater will adversely impact the overall hydrologic balance in the region. This is because no springs, seeps or other important groundwater resources have been identified in proposed mine pit areas (Drawing 7-1). In the pre-mining condition, any diffuse groundwater discharge to the ground surface that occurs is primarily lost to evapotranspiration and does not contribute appreciably to the overall hydrologic balance in the area.

Diminution of down-gradient groundwater resources

Where groundwater flow paths that convey groundwater to down-gradient areas exist in areas that will be mined, there is the potential that diminution of down-gradient groundwater resources could occur. In the proposed Coal Hollow Mine permit area, it is considered unlikely that appreciable diminution of down-gradient resources will occur as a result of mining and reclamation activities. The basis of this conclusion is presented below.

Groundwater resources in the Tropic Shale are meager and groundwater flow rates are very slow through the marine shale unit. Groundwater systems in the Tropic Shale do not support appreciable spring or seep discharge nor do they provide measurable baseflow to streams down-gradient of mining areas. Consequently, the potential for adverse impacts

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to the hydrologic balance as a result of mining through Tropic Shale is considered minimal.

Similarly, groundwater resources in the Dakota Formation are meager. The potential for lateral and vertical migration of groundwater through the formation is limited by the pervasiveness of low-permeability shaley strata in the formation and the lateral discontinuity of permeable strata. Groundwater systems in the Dakota Formation do not support appreciable spring or seep discharge nor do they provide measurable baseflow to streams down gradient of mining areas. Additionally, with the exception of the relatively low-permeability Smirl coal seam located at the top of the formation, groundwater systems in Dakota Formation rock strata below the coal seam will not be disturbed by mining and reclamation activities. Consequently, the potential for adverse impacts to the hydrologic balance as a result of mining through Dakota Formation strata is considered minimal. It should be noted that spring SP-4 discharges at about 1 gpm approximately 1.1 miles south of the proposed Coal Hollow Mine permit area from an apparent fault/fracture system in the Dakota Formation that may be related to the Sink Valley Fault. It is unlikely that appreciable migration of groundwater through the Sink Valley Fault system in the relatively impermeable Tropic Shale or shallow alluvium in the proposed Coal Hollow Mine permit area occurs. Consequently, it is considered unlikely that mining and reclamation activities in the proposed Coal Hollow Mine permit area will cause a diminution of discharge from spring SP-4.

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Alluvial groundwater systems in proposed mining areas area supported primarily by clays, silts, and fine-grained sands. In proposed mining areas in Sink Valley, appreciable coarse-grained alluvial sediments were not encountered in drill holes or back-hoe excavations. Significant layers of clean coarse alluvium, which could rapidly convey significant amounts of groundwater, were likewise not observed. The results of slug testing performed on wells in and adjacent to proposed mining areas likewise suggest that the potential for rapid migration of groundwaters through alluvial sediments in proposed mining areas is low (Tables 7-8 and 7-9). These data and observations suggest that the flux of groundwater migrating through the alluvial sediments in proposed mining areas in Sink Valley (that could support down-gradient groundwater systems) is not large. Much of the groundwater migrating through the alluvial sediments in proposed mining areas (in the East ¼ of Section 30, T39S, R5W) likely leaves the groundwater system through diffuse discharge to the land surface and is lost evapotranspiration and does not contribute to the overall hydrologic balance in the area. In Sink Valley, a preferential pathway for alluvial groundwaters through deep coarse-grained alluvial sediments likely exists along the east side of Sink Valley. While the thickness of the alluvium in proposed mining areas in Sink Valley generally does not exceed 50 feet (and in many locations is much less), the alluvial sediments along the eastern side of Sink Valley adjacent to proposed mining areas range from about 120 to 140 feet. Of the total flux of groundwater through the alluvial groundwater systems in Sink Valley, most of the flux is likely through this coarse-grained portion of the system. The percentage of the total flux that migrates through clayey and silty alluvial sediments in proposed mining areas along the western flanks of Sink Valley is likely much less.

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It should be noted that highly permeable strata were encountered from about 60 to 75 feet depth just above the bedrock interface at the SS well cluster (monitoring well SS-75; Table 7-2). This well is screened in an area of burned or eroded coal (the coal is absent) and consequently, mining will not occur at this location. The coal seam is present at the nearby C9 cluster area. Were mining operations to intercept this highly permeable zone, substantial groundwater inflows into the mine openings could occur. Consequently, prior to surface mining in this area, the boundary between the competent coal seam and the area of burned or eroded coal will be more precisely defined by drilling or other suitable techniques such that mine openings can be designed to avoid these areas of potentially large groundwater inflows.

As discussed in Section 722 above, alluvial groundwater from Sink Valley discharges to several springs and seeps and as diffuse discharge to the ground surface in the northwest ¼ of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). This groundwater discharge is likely a result of the constriction in Sink Valley in this area and the corresponding decrease in the cross-sectional area of the alluvial sediments in the valley, which forces groundwater to discharge at the surface. Most of the groundwater discharge in this area is likely derived from the up-gradient alluvial groundwater systems in the eastern portion of the valley (i.e., the coarse-grained portion of the alluvial groundwater system), which is situated east of the proposed Coal Hollow Mine permit area. This conclusion is based on 1) the substantially larger cross-sectional area of the alluvium in the deeper eastern portion of the valley relative to that in proposed mining areas near the western margins of the valley, 2) the higher hydraulic conductivity of the sediments in the coarse-grained part of the alluvial system, and 3) the lack of other apparent discharge mechanisms for the coarse-grained system further downstream in Sink Valley Wash (i.e., there are no significant alluvial springs or seeps further downstream in Sink Valley Wash and the system apparently does not contribute measurable baseflow to Sink Valley Wash further downstream (at least at the surface in the stream channel, as evidenced by the lack of baseflow in the wash monitored at SW-9).

Because most of the alluvial groundwater discharge supporting springs and seeps in this area is likely not derived from groundwater systems that underlie planned mining areas in the proposed Coal Hollow Mine permit area, it is considered unlikely that discharges from the springs and seeps in northwest ¼ of Section 32 T39S, R5W will be appreciably diminished as a result of the proposed mining and reclamation activities. While considered unlikely, some temporary impacts to discharge rates from springs and seeps in this area are possible. In particular, it should be noted that mining in the southernmost portions of the proposed Coal Hollow Mine permit area has a somewhat greater potential to decrease groundwater discharge rates at spring SP-6, which is located about 600 feet below the southernmost proposed mining areas (Drawing 7-2). SP-6 is an alluvial seep which has been impounded with an earthen dam from which measurable discharge is generally not present.

It is critical to note that individual mine pits in this area will remain open for short lengths of time, generally no more than about 60 to 120 days. Mining operations in the vicinity near the alluvial groundwater discharge area in the northwest ¼ of Section 32

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T39S, R5W are planned to be completed in about 1 year. Thus, any potential impacts to discharge rates from down-gradient groundwater systems will be short-lived. Following the backfilling and reclamation of mine openings, the potential for interception or re-routing of alluvial groundwater away from the groundwater discharge area in northwest ¼ of Section 32 T39S, R5W will be negligible. As stated above, most of the flux through the Sink Valley alluvial groundwater system that supports springs and seeps in the area occurs in the eastern portion of the valley, which will not be impacted by mining and reclamation activities. Consequently, long-term impacts to discharge rates from springs and seeps in this area are not anticipated. It should also be noted that if increased quantities of groundwater were to be encountered in mine workings in lower Sink Valley such that the water would need to be discharged to surface drainages, the mine water will ultimately be discharged to the Sink Valley Wash drainage (i.e., the water will remain in its drainage basin).

Alluvial groundwater systems in the Lower Robinson Creek area are much less extensive than the alluvial groundwater system in Sink Valley. Perched groundwater conditions exist locally in the alluvial groundwater system in the Lower Robinson Creek drainage. Other than the re-emergence of alluvial groundwater flowing beneath the Lower Robinson Creek stream channel where the stream channel exists directly on bedrock substrate, discharges from the alluvial groundwater system as springs or seeps in Lower Robinson Creek are not observed. Consequently, mining operations in the Lower Robinson Creek drainage will likely not result in diminution of down-gradient groundwater resources.

It should be noted that the proposed Coal Hollow Mine plan calls for the permanent diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of groundwater or surface-water resources, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

If any Utah State appropriated water rights are impacted by mining and reclamation operations in the proposed Coal Hollow Mine, these will be replaced according to all applicable Utah State laws and regulations using the designated water replacement source described in Section 727 above.

Draining of up-gradient groundwater resources

Where surface mining occurs adjacent to up-gradient groundwater systems, there is a potential that draining of groundwater from the up-gradient groundwater system into the mine voids could occur. This condition could occur if a sufficiently large and permeable stratum were to be intercepted that is in good hydraulic communication with the up-gradient groundwater system through which appreciable quantities of water could be transmitted.

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To more fully evaluate the potential for draining of up-gradient groundwater resources, a field investigation was performed during the winter of 2006-2007 that was designed to facilitate the characterization of the alluvial groundwater system in the proposed Coal Hollow Mine permit and adjacent area. Specifically, this program was designed 1) to better define the vertical and lateral extent of permeable, coarse-grained sediments in the alluvial groundwater system, 2) to characterize the water bearing and water transmitting properties of alluvial sediments, and 3) to evaluate the degree of hydraulic communication between the coarse-grained portion of the alluvial system in Sink Valley and the clayey alluvial sediments in proposed mining areas.

This field investigation included 1) the drilling and installation of 30 monitoring wells, 2) the performance of a 28-hour pumping and recovery test on alluvial production well Y-61 with contemporaneous measuring of water levels in the monitoring well network and contemporaneous measuring of spring discharge rates at three alluvial springs, and 3) the slug testing of 20 monitoring wells to determine approximate values of hydraulic conductivity. The results of the field investigation including analysis of the data collected in the investigation are presented in Appendix 7-1 and are summarized below.

Other than occasional pebbles or small rocks, coarse-grained sediments (i.e., gravels and coarse sands) were not encountered in the drilling of wells along the eastern margins of proposed mining areas in Sink Valley (C1, C2, C3, and C4 well clusters). (It should be noted that the C2 well cluster is located west of the eastern limit of the mine disturbance. The mine openings will intercept the C2 well cluster and the area to the east to locations west of well Y-102). Rather, the sediments encountered in the drilling of these wells were dominated by clays and silts with subordinate amounts of fine-grained sand. Similarly, coarse-grained deposits were not encountered in well clusters C6, C7, C8, and C9. There was no indication during drilling of any appreciable thickness of highly permeable strata through which groundwater could rapidly be transmitted (although it should be noted that the presence of thin sand layers are difficult to identify in wet auger drilling returns). Similarly, appreciable amounts of high-permeability coarse-grained alluvial sediments were not noted in alluvial sediments investigated in backhoe excavated pits and erosional escarpments in Sink Valley.

The hydraulic heads measured in alluvial monitoring wells near proposed mining areas in Sink Valley (C2, C3, C4, C7, C8, and C9) did not indicate artesian pressures. Rather, marked upward or downward vertical hydraulic gradients were not observed in any of these areas and water levels were consistently within several feet of the ground surface.

The results of pump testing in the alluvial groundwater system demonstrate that the springs in the northwest ¼ of Section 29, T39S, R5W are in direct hydraulic communication with the coarse-grained alluvial groundwater system in which the pumping well Y-61 is screened. Discharge rates (or water levels at Sorensen Spring) measured at each of the four springs (SP-8, SP-14, SP-20, and Sorensen spring) monitored during the 28-hour pumping test responded to pumping at the well. Monitoring wells at clusters C2, C3, and C4 near the easternmost proposed mining areas

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also showed small, muted responses, with declines measured in water levels during the 28-hour test ranging from about 0.05 to 0.10 feet. Other monitoring wells in proposed mining areas did not respond measurably to pumping at Y-61. It should be noted that after the pumping well was turned off at the end of the 28-hour pumping test, spring discharge rates and water levels in alluvial monitoring wells recovered to approximate pre-testing levels.

The results of slug testing of wells in the proposed Coal Hollow Mine and adjacent area are presented in Table 7-8. Using these hydraulic conductivity values together with measured thicknesses of saturated alluvial sediments determined during drilling, and hydraulic gradient values determined from water levels measured in monitoring wells, rates of estimated groundwater inflows to mine openings have been calculated using Darcy's Law (Table 7-9).

Darcy's Law may be expressed as.

$$Q = KIA$$

Where	Q	=	groundwater discharge rate
	K	=	hydraulic conductivity
	I	=	hydraulic gradient
	A	=	cross-sectional area

The values listed in Table 7-9 are reported as inflow rates per 100 lineal feet of mine openings oriented perpendicular to the groundwater flow direction. Calculations at individual locations are adjusted for the thickness of the saturated alluvium at that location. For all calculations in Table 7-9, a gradient of 0.10 has been used, which is considered a conservative estimate for the alluvial groundwater system in the vicinity of the planned Coal Hollow Mine workings. It is important to note that while values for saturated aquifer thickness and local hydraulic gradient in the alluvial groundwater system can be determined relatively precisely, hydraulic conductivity values determined from slug testing methods are generally considered as order-of-magnitude estimates. Consequently, the information from Table 7-9 should be used for general purposes only. The estimated groundwater inflow rates presented in Table 7-9 suggest that copious, unmanageable amounts of alluvial groundwater will likely not be encountered. It should be noted, however, that alluvial sediments located east of the C2 well cluster may contain coarser grained sediments similar to those intercepted in well Y-102. Special mining protocols will be employed when mining in these and adjacent areas (pits 13-15; see Section 728.333) to minimize the potential for interception of large groundwater inflows.

As surface mining operations advance toward the alluvial groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A), the information in Table 7-9 suggests that groundwater inflow rates in this area will be modest, generally on the order of a few tens of gallons per minute or less per 100

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lineal feet of mine opening. However, it should be noted that, as discussed above, if mine openings in this area were to intersect a substantial thickness of coarse-grained alluvial material that was in good hydraulic communication with the coarse-grained alluvial system located along the eastern margins of Sink Valley, substantially greater rates of groundwater inflow could occur. Based on the information in Tables 7-8 and 7-9, this is not considered likely.

As mining operations advance toward the alluvial groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A) and groundwater discharge from up-gradient alluvial groundwater systems occurs, there is the potential that discharge rates from alluvial springs in this area could be diminished. The magnitude of this potential impact will be largely dependent on the drainage rate and volume of groundwater that may be drained from the up-gradient alluvial groundwater system.

The potential for diminution of discharge from alluvial springs near proposed mining areas near the northwest ¼ of Section 29, T39S, R5W will be minimized because:

1) As mining progresses toward the groundwater discharge area in the northwest ¼ of Section 29, T39S, R5W (see Drawing 7-4, groundwater discharge area A), groundwater inflows into mine openings and discharge rates from the nearby alluvial springs will be closely monitored. If groundwater inflow rates into mine openings are excessive, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, and

2) Individual mine pits in the proposed Coal Hollow Mine will remain open for short lengths of time, generally no more than about 60 to 120 days. Consequently, any potential impacts to spring discharge rates in the alluvial groundwater system in this area will likely be short-lived. Because the alluvial groundwater recharge areas are located well up-gradient of proposed mining areas (mountain-front recharge) and will not be impacted, recharge to the alluvial system should continue uninterrupted, it is anticipated that water levels in the artesian groundwater system should recover from any mining-related declines in hydraulic head subsequent to the completion of mining in the area.

Groundwater discharge from the springs in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A) do not contribute any measurable baseflow discharge to streams in the area. This conclusion is based on the lack of any baseflow discharge in streams down-gradient of this area in Sink Valley (see monitoring data for SW-6 and SW-9). Rather, most of this discharge is likely ultimately lost to evapotranspiration as the water migrates across the low-permeability, near-surface clayey sediments in Sink Valley. Consequently, the potential temporary diminution of discharge

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from alluvial springs in the northwest ¼ of Section 29, T39S, R5W would not result in appreciable adverse impacts to the surrounding hydrologic balance.

If any Utah State appropriated water rights are impacted by mining and reclamation operations in the proposed Coal Hollow Mine, these will be replaced according to all applicable Utah State laws and regulations using the designated water replacement source described in Section 727 above.

728.320 Presence of acid-forming or toxic-forming materials

Chemical information on the acid- and toxic-forming potential of earth materials naturally present in the proposed permit area are presented in Appendix 6-2. Chemical information on the low-sulfur Smirl coal seam proposed for mining is presented in Appendix 6-1 (confidential binder). Based on laboratory analytical data, it is apparent that acid-forming and toxic-forming materials that could result in the contamination of surface-water or groundwater supplies in the proposed Coal Hollow Mine permit and adjacent area are generally not present.

Selenium was not detected in any of the samples from the proposed Coal Hollow Mine permit area. Likewise, concentrations of water-extractable boron were also low, being less than 3 mg/kg in all samples analyzed. The pH of groundwaters in and around the proposed Coal Hollow Mine permit area are moderately alkaline (UDOGM, 2007). Data in Appendix 6-2 likewise indicate moderately alkaline conditions in sediments in the proposed permit area. The solubility of dissolved trace metals is usually limited in waters with alkaline pH conditions. Consequently, high concentrations of these metal constituents in groundwaters and surface waters with elevated pH levels are not anticipated. Additionally, most of the materials that will be handled as part of mining and reclamation activities in the proposed Coal Hollow Mine area are of low hydraulic conductivity (i.e. clays, silts, shales, siltstones, claystones, etc.). Consequently, it is anticipated that groundwater seepage volumes through low-permeability backfill and reclaimed land surfaces in reclaimed mine pit areas and excess spoils storage areas will not be large. Additionally, reclaimed areas will be regraded, sloped, and otherwise managed to minimize the potential for land erosion, to restore approximate surface-water drainage patterns, and also to minimize the potential for ponding of surface waters on reclaimed areas (other than "roughening" or "gouging" of some areas to enhance reclamation). Thus, the potential for interactions between large amounts of disturbed earth materials and groundwaters and surface waters, which could result in leaching of chemical constituents into groundwater and surface-water resources, will be minimized.

Additionally, the mining plan calls for the emplacement of 40 inches of suitable cover material over backfilled areas made up of material types which could appreciably impact vegetation (materials with elevated SAR ratios or other physical or chemical characteristics that could adversely impact vegetation).

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The neutralization potential greatly exceeded the acid potential in all samples analyzed, with the neutralization potential commonly exceeding the acid potential by many times, suggesting that acid-mine-drainage will not be a concern at the proposed Coal Hollow Mine. Acid-forming materials in western coal mine environments often consist of sulfide minerals, commonly including pyrite and marcasite, which, when exposed to air and water, are oxidized causing the liberation of H^+ ions (acid) into the water. Oxidation of sulfide minerals may occur in limited amounts in the mine pits where oxygenated water encounters sulfide minerals. However, the acid produced by pyrite oxidation is quickly consumed by dissolution of abundant, naturally occurring carbonate minerals (Appendix 6-2). Dissolved iron is readily precipitated as iron-hydroxide in well aerated waters, and consequently excess iron is not anticipated in mine discharge water.

Other acid-forming materials or toxic-forming materials have not been identified in significant concentrations nor are such suspected to exist in materials to be disturbed by mining.

Because of the overall low-permeability of the rock strata and sediments surrounding the mine workings (primarily the shales and claystones of the lower Tropic Shale), the potential for seepage of mine water outward into adjacent stratigraphic horizons is low. Additionally, because the floors of the mine pits need to be accessible in order to extract the coal, the mining operations will be carried out in such a manner that the accumulation of large amounts of water in the mine pits will be avoided.

728.331 <u>Sediment yield from the disturbed area.</u>

Erosion from disturbed areas will be minimized through the use of silt fences and other sediment control devices. Surface runoff occurring on disturbed areas will be collected and treated as necessary to remove suspended matter. Four diversion ditches along with four sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas. The backfilled material will be stabilized by grading to promote a reduction of the rate and volume of runoff in accordance with the applicable requirements. The excess spoil and fill above approximate original contour will be graded to a maximum 3h:1v slope and revegetated to minimize erosion.

Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not

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expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles. The location and details for roads can be viewed on Drawings 5-3 and 5-22 through 5-24.

Through the implementation of these sediment control measures, it is anticipated that sediment yield from disturbed areas in the proposed Coal Hollow Mine permit area will be minimized.

728.332 Impacts to important water quality parameters

As discussed above, appreciable quantities of groundwater are not anticipated to be intercepted in the Tropic Shale overlying proposed mining areas. Consequently, discharge of Tropic Shale groundwaters from mining areas is not anticipated. Because of the very low hydraulic conductivity of the marine Tropic Shale unit which immediately overlies the coal in proposed mining areas, the lateral migration of appreciable amounts of groundwater outward from proposed mine pit areas is not anticipated. Therefore, no impacts to important water quality parameters in surrounding groundwater and surface-water resources that could result from the interception of Tropic Shale groundwaters are anticipated.

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Similarly, appreciable quantities of groundwater are not expected to emanate from the Dakota Formation in the mine floor into the mine openings. This conclusion is based on the fact that 1) vertical and horizontal groundwater flow in the Dakota Formation is impeded by the presence of low-permeability shales that encase the interbedded lenticular sandstone strata in the formation (i.e., the formation is not a good aquifer), 2) appreciable natural discharge from the Dakota Formation in the surrounding area to springs or streams is not observed, supporting the conclusion that the natural flux of groundwater through the formation is meager, and 3) mining will commence near the truncated up-dip end of the formation, minimizing the potential for elevated hydraulic head in the Dakota Formation. The results of slug testing performed on wells screened in the Smirl coal seam indicate relatively low values of hydraulic conductivity for the coal seam (Table 7-8). In much of the proposed mining area, the coal seam is dry. Thus, large inflows of groundwater from the coal seam into mine workings are not anticipated. Likewise, the potential for seepage out of mine pits through the coal seam is minimal. Consequently, impacts to important water-quality parameters in the Dakota Formation potentially resulting from mining operations are not anticipated, nor are impacts to important water-quality parameters in surrounding groundwater and surface-water systems anticipated as a result of interactions with intercepted Dakota Formation groundwater.

The water quality of groundwaters in the alluvial groundwater system up-gradient of mining operations will likely not be impacted by mining and reclamation activities in the proposed Coal Hollow Mine. Were alluvial groundwaters intercepted by mine openings allowed to flow into the mine pits, there would be the potential for substantially increased

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TDS concentrations as the water interacts with the marine Tropic Shale and the Smirl coal seam. This occurrence will be avoided.

As groundwater naturally migrates through the shallow, fine-grained alluvial sediments in the proposed Coal Hollow Mine permit and adjacent area (most evident in Sink Valley), the quality of the water is naturally degraded (see Appendix 7-1). In the distal portions of Sink Valley, most notably concentrations of magnesium, sulfate, and bicarbonate are elevated in the alluvial groundwater.

The potential for TDS increases associated with interaction of waters with the Tropic Shale can be minimized by avoiding contact where practical between water sources and earth materials containing soluble minerals. Where possible, groundwater that will be encountered in alluvial sediments along the margins of mine pit areas will be routed through pipes, ditches or other conveyance methods away from mining areas via gravity drainage so as to prevent or minimize the potential for interaction with sediments disturbed by mining operations (including contact with the mined coal seam). If diverted alluvial groundwater were allowed to interact extensively with the Tropic Shale bedrock or Tropic Shale-derived alluvial sediments, similar increases in magnesium, sulfate, bicarbonate, and TDS concentrations would be anticipated. Consequently, where intercepted groundwaters will be routed around disturbed areas through pipes or well-constructed and maintained ditches, it is anticipated that detrimental impacts to important water quality parameters in these waters will be minimal.

The pumping and discharging of mine water from mine pits at the proposed Coal Hollow Mine permit area is not anticipated. The impoundment of substantial quantities of water within the mine pits would likely result in degradation of groundwater quality and is also not compatible with the proposed surface mining technique (the coal extraction operations occur at the bottom of the mine pit and thus they cannot be performed in flooded mine pits). As discussed above, the only likely foreseeable source of appreciable quantities of groundwater is from the alluvial groundwater systems overlying the low-permeability Tropic Shale in proposed mining areas. Where this alluvial groundwater is encountered in mining areas, it will be diverted away from mine workings prior to significant interaction with sediments in disturbed areas. Any discharge from the mine pits that does occur will be regulated under a Utah UPDES discharge permit.

Acid mine drainage is not anticipated at the proposed Coal Hollow Mine permit area. This is due primarily to the relatively low sulfur content of the coal (see Appendix 6-1; confidential binder) and rock strata in the permit and adjacent area, and to the pervasiveness of carbonate minerals in the soil and rock strata which neutralize the acidity of the water if it occurs. If sulfide mineral oxidation and subsequent acid neutralization via carbonate dissolution were to occur, increases in TDS, calcium, magnesium, sulfate, and bicarbonate concentrations (and possibly also sodium concentrations via ion-exchange with calcium or magnesium on exchangeable clays) would be anticipated.

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An analysis of the acid/base potential of samples collected from the overburden and underburden in the proposed mining area indicates that acid mine drainage will be unlikely to occur at the Coal Hollow Mine. The results of laboratory analysis of the acid/base potential of samples collected from the overburden, underburden, and Smirl coal zone are presented in Appendix 6-2. None of the overburden or underburden samples were acid forming, as each of the intervals sampled showed excess neutralization potential. Taken as a whole, the un-weighted composite average acid/base potential of the 57 overburden and underburden samples indicates a net neutralization potential of 174 tons per kiloton. The neutralization potential of the composite overburden/underburden (180 tons per kiloton) exceeds the acid potential (5.5 tons per kiloton) by more than 32 times. A general consensus opinion mentioned by the National Mine Land Reclamation Center (OSM, 1998) is that if the net acid/base potential exceeds 30 tons per kiloton, and the ratio of neutralization potential to acid potential exceeds two, then *alkaline* water will be generated and acid mine drainage will not occur. The acid/base characteristics of composite overburden and underburden in the Coal Hollow Mine area greatly exceed both of these two criteria, suggesting the strong likelihood that acid mine drainage will not be an issue at the Coal Hollow Mine.

Because of the net neutralization potential of the composite overburden/underburden in the Coal Hollow Mine area described above, the pH values of groundwater in fill areas will likely be neutral to alkaline. Accordingly, the solubility of dissolved trace metal species in the alkaline water will likely be low. Consequently, the potential for the mobilization and transport of trace metals in groundwater in the fill will likely also be low. Concentrations of total selenium, water extractable selenium, water extractable boron and other important chemical species in the overburden samples from the Coal Hollow Mine area are generally low. Water extractable selenium concentrations in the analyzed Dakota Formation underburden samples range from 0.05 to 0.2 mg/kg (see Appendix 6-2). Water extractable boron concentrations in the Dakota Formation underburden in a single location (CH-08; 6.5 mg/kg) marginally exceed the Division standard of 5 mg/kg. The limited quantities of material containing water extractable selenium and boron in these concentration ranges in backfill materials are not anticipated to result in appreciably elevated selenium or boron concentrations in groundwater or surface water supplies. Because the hydraulic conductivity of the composite run-of-mine backfill material (which will be rich with clays, silts, and shale) is expected to be low, the flux of groundwater that might migrate through the backfilled pit areas is likely to be low. Additionally, the reclaimed land surface will be graded to promote runoff of surface waters overlying backfilled areas, thus minimizing the potential for infiltration of surface waters into backfilled areas. Consequently, the potential for acid mine drainage or toxic drainage from backfilled areas to surrounding groundwater and surface-water supplies will be minimized.

As outlined in the topsoil and subsoil sampling plan in Chapter 2 of this MRP, materials with poor quality SAR, elevated selenium or boron concentrations, or poor pH as defined by Division guidelines will not be placed in the upper four feet of the reclaimed surface. These materials will also not be placed in the backfill within the top four feet of ephemeral drainages with 100 year flood plains, or in the top four feet in surface water

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impoundments, or in the top four feet in intermittent or perennial drainages including 100 year flood plains as outlined in the Division guidelines. Materials placed in the top four feet will be sampled to ensure that only suitable materials are placed in the top four feet of the reclaimed surface.

It is noteworthy that in the neighboring state of Wyoming, a water extractable selenium standard of 0.3 mg/kg is considered suitable for topsoil and topsoil substitutes, with concentrations ranging from 0.3 to 0.8 mg/kg being considered marginally suitable for topsoil and topsoil substitute.

As is typical with coal seams regionally, laboratory analyses of coal samples from the Coal Hollow Mine area indicates that there is a net acid forming potential in the coals of the Smirl coal zone (see Appendix 6-2). However, the mining plans call for the mining and removal of 95% of the total coal seam thickness from mining areas, leaving only minor amounts of coal in backfilled areas. Consequently, the potential contribution to the overall acid/base potential of the composite backfill material would be small. Assuming a worst-case-scenario – that all the coal would be retained in the backfill material – the calculated acid/base potential of the composite backfill material is still well within the limits suggested by OSM (1998) to indicate that alkaline discharge without acid mine drainage would be likely.

As described in Chapter 5, Section 532, surface runoff that occurs on disturbed areas will be treated through sedimentation ponds or other sediment-control devices and particulate matter will be allowed to settle prior to the discharging of the water to the receiving water, thus controlling suspended solids concentrations.

At any mining operation there is the potential for contamination of soils, surface-water and groundwater resources resulting from the spillage of hydrocarbons. Diesel fuels, oils, greases, and other hydrocarbons products will be stored and used at the mine site for a variety of purposes. A spill Prevention Control and Countermeasure Plan will be implemented that will help minimize any potential detrimental impacts to the environments.

Spill control kits will be provided on all mining equipment and personnel will be trained to properly control spills and dispose of any contaminated soils in an appropriate manner.

Based on these findings, it is concluded that the potential for mining and reclamation activities in the proposed Coal Hollow Mine permit area to cause detrimental impacts to important water quality parameters is minimal.

728.333 Flooding or streamflow alteration

As described above, appreciable groundwater inflow from the Tropic Shale and Dakota Formation into mine pits at the proposed Coal Hollow Mine are not anticipated. Appreciable groundwater inflows are anticipated only from the relatively thin, overlying

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alluvial groundwater systems. The thicknesses of the alluvium adjacent to mine openings in the proposed mining areas is generally less than 40 to 50 feet. The hydraulic conductivities of the predominantly clayey and silty alluvial sediments are low, and consequently, very large or sudden groundwater inflows into mine openings are not anticipated. Where appreciable alluvial groundwater is encountered adjacent to mine openings, it will be routed away from mining areas through ditches of other conveyance mechanisms. Consequently, discharge of mine water from the mine pits is not anticipated. The rates of alluvial groundwater drainage that could occur will likely not be of a magnitude that could potentially cause flooding or streamflow alteration in either the Sink Valley Wash or Lower Robinson Creek drainages.

If excess groundwater were to be encountered during mining operations such that it could not be adequately managed or discharged in compliance with the Utah UPDES discharge permit (which is considered unlikely), Alton Coal Development, LLC may when necessary construct supplemental containment and settlement ponds in which mine discharge waters may be held for treatment (where necessary) and subsequent discharge through UPDES discharge points in compliance with the UPDES discharge permit, minimizing the potential for flooding or streamflow alteration in areas adjacent to mining. To ensure that the mine is able to deal with any unforeseen

When coal mining near the eastern edge of the Coal Hollow Mine permit area occurs (mine pits 13-15), special measures will be taken to minimize the potential for the interception by the mine openings of large quantities of groundwater from artesian groundwater system in the northwest ¼ of Section 29, T5W, R39S, and to adequately deal with groundwater inflows if such occur.

When mining operations advance toward the eastern edge of the permit boundary in pits 13, 14, and 15, material excavating in the alluvial sediments will be performed incrementally and with caution. As excavation proceeds, if coarse, water-bearing alluvial sediments (gravels) are encountered, overburden removal in that area will be stopped. The excavation equipment operator will recover the exposed gravel zone with local impermeable sediments (abundant in the alluvium in the area) to halt groundwater inflow if possible. The hydrogeologist will be called to the site to access the hydrogeologic conditions. An investigation of the situation will be performed and a suitable work plan will be developed prior to the resumption of overburden removal in that area. The work plan will be designed to minimize the potential for intercepting unacceptably large inflows of groundwater into the mine pits. The work plan will most likely involve trenching in the alluvium in zones up-gradient of the mine pit area and the emplacement of a low-permeability cut-off wall. The cut-off wall would be emplaced in the excavated trench using bentonite or other acceptable native low-permeability materials. The cut-off wall would be designed to isolate the mine openings from the coarse-grained alluvial groundwater system sufficient to decrease mine inflows to acceptable levels (i.e. so as to minimize the potential for detrimental impacts to the hydrologic balance and to minimize the potential for flooding of mine pits or causing flooding or stream alteration).

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As a temporary measure to manage any potential large groundwater inflows that may occur in these areas prior to the installation of a suitable up-gradient hydraulic barrier, the intercepted alluvial groundwaters would be routed along mine benches that "daylight" to the natural land surface in areas to the south. The water would be diverted into pond 4 which has an appreciable storage capacity and discharge structure.

It should be noted that the interception of moderate amounts of groundwater from shallow alluvial groundwater systems in these areas is considered likely. Modest inflows of shallow groundwater intercepted by the mine workings in these areas would be manageable and not of significant concern. The objective of the work plan would be to ensure that strong hydrodynamic communication between the coarse-grained artesian alluvial groundwater systems in the eastern portion of Sink Valley with the Coal Hollow Mine workings is not established.

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The rate at which alluvial groundwater will be intercepted by the proposed Coal Hollow Mine will be variable by location and time in permit area. Because of the heterogeneity inherent in most alluvial deposits, the quantifying of precise aquifer parameters in the various mining areas is not straightforward. Additionally, the geometry of the mine openings including the horizontal lengths and heights of mine pit faces adjacent to saturated groundwater systems that are exposed at any point in time are dynamic variables in the surface mining environment. Consequently, precise quantifications of mine groundwater interception rates are not readily obtainable. However, using the estimated mine pit groundwater inflow rates presented as discharge per linear foot of open pit in Table 7-9, it is considered likely that mine interception will be on the order of a few tens of gallons per minute in dry areas and at times when open pit sizes are small, to several hundred gallons per minute in wetter areas and at times when the open pit size is large. It is important to note that inflows into individual pit areas will be short lived, as the individual pits will commonly remain open for a few weeks to a few months.

The reasonably foreseeable maximum quantity of water that could be intercepted by the Coal Hollow Mine is largely a function of the manner in which coal mining operations are conducted in areas where the potential for encountering appreciable groundwater inflows is greatest. If large areas of water-bearing coarse-grained sediments were to be rapidly exposed in mine pit areas, large quantities of water would be anticipated (likely several thousands of gallons per minute). However, as described above, mining operations will be carried out in these areas using the special mining protocols described above. Consequently, large cross-sectional exposures of water-bearing coarse-grained alluvial sediments will not be allowed to be exposed to the mine pits and large inflows of groundwater on that magnitude are not anticipated.

In the unanticipated event that excessive quantities of water were to flow into the mine pits by any mechanism, the water would be pumped from the pits using a suitable pump and piping equipment that will be located on-site at the Coal Hollow Mine for such a contingency. Such water would be managed appropriately as required by all applicable State and Federal regulations. It should be noted that it is not in the mine's interest to allow excessive water to flow into the mine pits. All reasonable efforts will be taken to

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minimize the potential for flooding of the mine pits (an event that is not considered reasonably foreseeable or probable to occur).

Through the implementation of the above described mining protocols in areas where potentially large groundwater inflows could reasonably be anticipated to occur, the potential for the interception of large quantities of water by the mine is minimized. Consequently, the potential for flooding or streamflow alteration that could occur as a result of intercepting and discharging large quantities of water will be minimized and is considered unlikely.

The principal surface-water drainages in and adjacent to the proposed Coal Hollow Mine permit area are in many locations not stable in their current configurations (see photograph section). Currently, these stream drainages are actively eroding their channels during precipitation events, resulting in down-cutting and entrenchment of stream channels, the formation of unstable near-vertical erosional escarpments adjacent to stream channels (which occasionally spall off into the stream channel), aggressive headward erosion of stream channels and side tributaries, and the transport of large quantities of sediment associated with torrential precipitation events. These processes are currently actively ongoing in the proposed permit and adjacent area and the upper extents of these erosional processes are in many locations migrating upward in stream channels, resulting in increasing lengths of unstable stream channels.

Hereford (2002) suggests that the valley fill alluviation in the southern Colorado Plateau occurred during a long-term decrease in the frequency of large, destructive floods, which ended in about 1880 with the beginning of the historic arroyo cutting. Hereford (2002) further suggests that the shift from deposition to valley entrenchment coincided with the beginning of an episode of the largest floods in the preceding 400-500 years, which was probably caused by an increased recurrence and intensity of flood-producing El Nino Southern Oscillation events beginning at ca. A.D. 1870.

The exact causes of the entrenchment of stream channels and the creation of the numerous arroyos currently in existence in the southwestern United States are not completely understood. Vogt (2008) suggests that three primary factors resulted in the arroyo formation. These factors included 1) changes in climate that produced heavy rainfall, 2) land-use practices such as livestock grazing, and 3) natural cycles of erosion and deposition caused by internal adjustments to the channel system. The temporal coincidence of the causes may have magnified the effect of each factor.

Each of these factors likely contributed to the formation of the entrenched stream drainages and arroyos in the Coal Hollow Project area. Gregory (1917) states that historical evidence indicates that the cutting of Kanab Creek began when a large storm occurred on 29 July 1883, and that unusually large amounts of precipitation were received in 1884-85. In this period the Kanab Creek channel was down-cut by 60 feet and widened by 70 feet for a distance of about 15 miles. The lowering of Kanab Creek may have resulted in a lowering of the local base level and consequent incision of both Sink Valley Wash and Lower Robinson Creek. As suggested by Vogt (2008), other

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factors, such as the heavy livestock grazing in the local area, which was occurring contemporaneously with the heavy thunderstorm events, likely also contributed to the overall conditions that brought about the stream down-cutting episode in the late 1800s.

While the precise sequence of events and conditions that triggered the arroyo formation and stream entrenchment in the principle surface drainages in and adjacent to the Coal Hollow Project area is not known, it is readily apparent that the principle surface water drainages are not currently in a condition of equilibrium. Stream head-cutting (headward erosion), bank erosion, and spalling of the steep stream channel walls are ongoing processes in the Coal Hollow Project area.

The mining and reclamation plan for the Coal Hollow Mine has been designed to minimize the potential for sediment yield and erosion in the mine permit area. Accordingly, the mining and reclamation plan minimizes the potential for stream channel erosion and instability within the permit area. No mining-related activities are planned that would likely result in a worsening of the current instability of the surface water drainages in the permit and adjacent area.

The Coal Hollow Mine mining and reclamation plan calls for reclamation activities concurrent with mining progression, which results in the smallest disturbed area footprint and minimizes the length of time that the land surface is susceptible to erosion. The plan also calls for soil tackifiers to be used as a temporary soil stabilizer on reclamation areas prior to seeding. Seeded areas will be mulched. Vegetation established in final reclamation areas will minimize the potential for sediment yield and stream erosion in the long term.

The potential for erosion on the planned excess spoils pile will likewise be minimized. The design plans for the excess spoils pile call for the side slopes exceeding 60 feet in height to be constructed with concave slopes to promote slope stability and to minimize the erosion potential. The excess spoils pile will also be revegetated to minimize the erosion potential.

The Lower Robinson Creek reconstruction will likewise be constructed to promote stability and resistance to erosion. Details of the Lower Robinson Creek reconstruction are shown on Drawings 5-20A and 5-21A. The construction of the channel will include riprap of the channel bottom and the inclusion of an inner flood plane to minimize erosion during flooding events. The stream channel will be revegetated to minimize erosion potential. The Lower Robinson Creek reconstruction is designed to leave the drainage in a condition at final bond release that is at least as stable as the current pre-mining condition.

Following reclamation, stream channels will be returned to a stable state to the extent possible given the currently unstable state of natural drainage channels in the area. Stream channels will be designed to withstand anticipated storm events, thus minimizing the potential of flooding in the reclaimed areas.

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The overall condition of the land surface and the surface-water drainages within the permit area at final bond release will likely meet or exceed the current pre-mining conditions. However, it should be noted that Alton Coal Development, LLC will have no control over the land management practices and landowner activities that may be implemented on the privately owned lands of the reclaimed Coal Hollow Mine area after final bond release. Accordingly, the degree of erosional stability and overall conditions in the reclaimed lands and stream drainages in the post bond-release period is not in the control of Alton Coal Development, LLC.

The existing principle surface-water drainages adjacent to the proposed Coal Hollow Mine permit area have large discharge capacities (lower Sink Valley Wash below the County Road 136 crossing, Lower Robinson Creek, and Kanab Creek). These drainages periodically convey large amounts of precipitation runoff water associated with torrential precipitation events. The anticipated discharge rates from alluvial groundwater drainage and the maximum reasonably foreseeable amount of mine discharge water that could potentially be required to be discharged from mine pits is much less than that periodically occurring during major torrential precipitation events. The addition of modest amounts of sediment-free water into these stream channels has the potential to cause minor increases in channel erosion. However, the magnitude of this potential impact will likely be small relative to that occurring during torrential precipitation events.

Most precipitation waters falling on disturbed areas will be contained in diversion ditches and routed to sediment impoundments that are designed to impound seasonal water and storms. Sediment control facilities will be designed and constructed to be geotechnically stable. This will minimize the potential for breaches of sediment control structures, which if they occur could result in down-stream flooding and increases in stream erosion and sediment yield. Emergency spillways will be part of the impoundment structures to provide a non-destructive discharge route should capacities ever be exceeded.

Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

It should be noted that during the startup and construction phase of the mine operation, while the ditches and sediment control ponds are being constructed, temporary silt control measures will be utilized. These measures may include the use of silt fences or other appropriate sediment control measures as necessary.

As shown on Drawing 5-26, there are two sediment impound watershed areas within the mine permit area (Watershed 5 and Watershed 6) from which precipitation runoff water will not be routed through sediment ponds.

Watershed 5 area includes 28 acres near the Sink Valley Wash/Lower Robinson Creek drainage divide. The land surface in Watershed 5 is relatively flat, sloping at about a one percent grade. Because of the flatness of the land surface in Watershed 5, it is not practical to construct ditches to convey water from this area to a sediment pond. Consequently, control of sediment in runoff water from Watershed 5 will be

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accomplished through the use of a silt fence or other appropriate sediment control measure placed along the western permit boundary adjacent to Watershed 5 (see Drawing 5-26). Precipitation water falling on Watershed 5 will be retained as soil moisture, retained in the lowest portions of the watershed and allowed to evaporate or infiltrate or, after treatment with silt fences or other appropriate sediment control measures, allowed to flow down gradient onto lower lying adjacent areas.

Watershed 6 includes 19 acres located within the permit boundary east of the proposed Lower Robinson Creek reconstruction (see Drawing 5-26). The land surface in this area slopes gently toward the west at an approximately three to four percent grade. The Watershed 6 area will be isolated from a sediment pond by the reconstructed Lower Robinson Creek stream channel. Control of sediment in Watershed 6 will be accomplished through the installation of a silt fence or other appropriate sediment control measure along the margin of the watershed as shown on Drawing 5-26. The soils on the post-mining land surface in Watershed 6 will initially be stabilized with the use of tackifiers. Subsequent revegetation of the land surface in Watershed 6 will minimize the potential for erosion. After treatment with silt fences or other appropriate sediment control measures, precipitation water falling on Watershed 6 will be allowed to flow down-gradient toward adjacent lands or toward the Lower Robinson Creek stream channel.

The potential for flooding or streamflow alteration resulting from mining and reclamation activities at the proposed Coal Hollow Mine permit area is considered minimal.

728.334 Groundwater and surface water availability

Groundwater use in the proposed Coal Hollow Mine permit and adjacent area is generally limited to stock watering and domestic use in Sink Valley. Some limited use of spring discharge water for irrigation has occurred in Sink Valley, although such irrigation is not occurring presently nor has it occurred in at least the past 10 years. The areas of groundwater use in the proposed Coal Hollow Mine permit and adjacent area are located in the northwest ¼ of Section 29, T39S, R5W (see Drawing 7-4; groundwater discharge area A), and in the northwest ¼ of Section 32, T39S, R5W (see Drawing 7-4; groundwater discharge area B). The likely future availability of groundwater in each of these areas is discussed below.

Groundwater discharge area A (Northwest ¼, Section 29, T39S, R5W)

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Groundwater use in area A occurs from several alluvial springs and seeps that are used for stock watering and limited domestic use. As described in Section 728.311 above, short-term diminution in discharge rates from springs in northwest ¼ of Section 29, T39S, R5W are possible as mining operations advance toward these springs. This potential impact is associated with the possible drainage of up-gradient alluvial groundwater into mine openings as mining advances toward groundwater discharge area

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A. Because individual mine pits will typically remain open for less than about 60 to 120 days before subsequently being backfilled and reclaimed, the potential for long-term drainage of alluvial groundwater into the mine voids is negligible, and thus any potential decreases in alluvial discharge in groundwater discharge area A is anticipated to be short-lived.

If groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities. Consequently, the potential that groundwater could become unavailable in this area is minimal. Additionally, if alluvial groundwater resources were to become unavailable in this area due to mining and reclamation activities in the proposed Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above.

It should be noted that the proposed water replacement source, water well Y-61, produces water from the coarse-grained alluvial groundwater system in Sink Valley. Nearby springs that could potentially be impacted by mining and reclamation activities are supported by the same alluvial groundwater system. However, while modest decreases in the artesian hydraulic pressures in the alluvial groundwater system could potentially result in diminution of spring flows, water well Y-61 is 150 feet deep and will be equipped with an electric well pump providing the capability to produce groundwater from the alluvial system even if the hydraulic head in the alluvial groundwater system were to be diminished such that artesian flow conditions temporarily ceased to exist.

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Groundwater discharge area B (Northwest ¼, Section 32, T39S, R5W)

Groundwater use in groundwater discharge area B occurs at alluvial springs and seeps located southeast of the proposed Coal Hollow Mine permit area that are used for stock watering and limited domestic use. As described in Section 728.311 above, although some temporary and short-lived diminution in discharge rates from springs in northwest ¼ of Section 29, T39S, R5W is possible, this potential impact is not considered likely.

In the event that alluvial groundwater resources were to become unavailable in this area due to mining and reclamation activities in the proposed Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above.

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Surface-water availability

Surface-water use in the proposed Coal Hollow Mine permit and adjacent area occurs in the Sink Valley Wash drainage and in Lower Robinson Creek. Surface waters in the Sink Valley Wash drainage (primarily from Water Canyon via an irrigation diversion and from Swapp Hollow; appreciable discharge in Sink Valley Wash below Section 29 T39S, R5W is usually absent) are utilized for both stock watering and limited irrigation use. Stream water in the Sink Valley Wash drainage is derived from runoff from the adjacent Paunsaugunt Plateau area. Because the surface water in the drainage originates from areas up-gradient areas located large distances from proposed mining areas, and because the stream channel is entirely outside the permit area and will not be impacted by mining and reclamation activities, there is essentially no probability that surface water availability in the Sink Valley Wash drainage could become unavailable as a result of mining and reclamation activities.

Discharge in Lower Robinson Creek immediately above the proposed Coal Hollow Mine permit area typically occurs only in direct response to significant precipitation or snowmelt events. Thus, surface-water availability is currently limited in this drainage prior to any mining activities.

Seepage of alluvial groundwater into the deeply incised lower Robinson Creek stream channel occurs near the contact with the underlying Dakota Formation in the southeast quarter of Section 19, T39S, R5W. This water is likely related to saturated alluvial deposits directly underlying the Robinson Creek stream channel and emerges near where the stream channel intersects the alluvial groundwater system. This seepage of alluvial water is usually about 5 - 10 gpm or less and is routinely monitored at monitoring station SW-5 (Drawing 7-2).

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It should be noted that the proposed Coal Hollow Mine plan calls for the permanent diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

The information presented above suggests that the potential for significant impacts to groundwater and surface-water availability resulting from mining and reclamation activities in the proposed Coal Hollow Mine permit and adjacent systems in the region is low.

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728.340 Whether mining and reclamation activity will result in contamination, diminution or interruption of State-appropriated waters

State appropriated water rights in the proposed Coal Hollow Mine permit and adjacent area are shown on Drawing 7-3 and tabulated in Appendix 7-3.

Appropriated groundwaters include alluvial springs and seeps in the northwest ¼ of Section 29, T39S, R5W (groundwater discharge area A), springs and seeps in the northwest ¼ of Section 32, T39S, R5W (groundwater discharge area B). State appropriated surface waters include reaches of Sink Valley Wash east of the proposed Coal Hollow Mine permit area, and reaches of Lower Robinson Creek.

The potential for mining and reclamation activities at the proposed Coal Hollow Mine permit area to result in contamination, diminution or interruption of State-appropriated water in the proposed Coal Hollow Permit and adjacent area are described in detail in Sections 728.310, 728.320, 728.332, and 728.334.

With the possible exception of short-term diminution in discharge rates from springs and seeps in the northwest ¼ of Section 29, T39S, R5W, Contamination, diminution, or interruption of State-appropriated waters in the proposed Coal Hollow Mine permit and adjacent area are not anticipated. It should be noted that if groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, minimizing the potential for diminution of discharge rates from these springs.

Additionally, it should be noted that the proposed Coal Hollow Mine plan calls for the permanent diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

In the event that any State appropriated waters were to be contaminated, diminished, or interrupted due to mining and reclamation activities in the proposed Coal Hollow Mine permit area, groundwater will be replaced according to all applicable State laws and regulations using the replacement water source described in Section 727 above.

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730 OPERATION PLAN

Coal mining in the proposed Coal Hollow Mine permit area will occur using surface mining techniques. All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302. Operations will be conducted to assure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

In order to maximize the use and conservation of the coal resource, coal will be recovered using large hydraulic backhoes or front end loaders and off-road trucks. Mined coal will be hauled to a central coal processing area for crushing and placement into a stockpile. Coal from the stockpile will be transferred into a bin and loaded into over the road trucks for transport.

The plan, with Drawings, cross sections, narrative, descriptions, and calculations indicates how the relevant requirements will be met. The lands subject to coal mining and reclamation operations over the estimated life of the operations are identified and briefly described. All appropriate information is located in the subsequent sections and Drawings 5-1 through 5-39 and Appendices A5-1 through A5-3.

731 GENERAL REQUIREMENTS

Operations will be conducted to assure protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

Groundwater and Surface-Water Protection

To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acid, toxic, or other harmful infiltration to the groundwater system. Additionally, excavations, and disturbances will be managed to prevent or control discharges of pollutants to the groundwater.

Products including chemicals, fuels, and oils used in the mining process will be stored and used in a manner that minimizes the potential for these products entering groundwater systems. Concrete oil and fuel containments will be constructed as shown on Drawings 5-3 and 5-8.

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The wash bay at the mine site will include a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment, thus minimizing water consumption the potential for contamination of groundwater resources. Details for this structure can be viewed on Drawings 5-3, and 5-8.

As mining operations approach springs and seeps in the northwest ¼ of Section 29, T39S, R5W (See Drawing 7-4; groundwater discharge area A), there is the potential for drainage of up-gradient into mine openings to cause short-lived diminution of discharge from these springs. If groundwater inflow rates into mine openings in this area are excessive, such that appreciable impacts to the springs and seeps in groundwater discharge area A are likely, where necessary Alton Coal Development, LLC will use a suitable technique to minimize groundwater inflow rates into the mine voids. These techniques may include the use of bentonite or natural clay filled cutoff walls or other means where appropriate to isolate and protect groundwater resources up-gradient of mining activities, minimizing the potential for diminution of discharge rates from these springs.

The mine will replace loss of water identified for protection in this MRP that are impacted by mining and reclamation operations.

To protect the hydrologic balance, coal mining and reclamation operations will be conducted to handle earth materials and runoff in a manner that minimizes acidic or toxic drainage, prevents to the extent possible, additional contributions of suspended solids to streamflow outside the permit area and otherwise prevents water pollution. Runoff and sediment control measures are described in detail in Chapter 5 of this MRP. The mine will maintain adequate runoff- and sediment-control facilities to protect local surface waters.

Discharge of mine water that has been disturbed by coal mining and reclamation operations is not anticipated. However, any discharges of water from areas disturbed by coal mining and reclamation operations that do occur will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR part 434. Discharge of mine waters will be regulated by a Utah UPDES discharge permit.

Water pollution associated with mining and reclamation activities within the permit areas will be controlled by:

- Construction of berms and/or diversion ditches to control runoff from all facilities areas.
- Roads will be constructed with ditches to capture runoff
- Diversion ditches will be constructed as necessary around active mining and reclamation areas to capture runoff from those areas.

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- Sedimentation impoundments will be constructed to control discharges
- In areas where impoundments or diversions are not suitable to the surrounding terrain, silt fence or straw bales will be utilized to control sediment discharge from the permit area.

In order to accomplish these objectives, watershed analysis of the permit and adjacent areas has been completed and specific designs are established for each water pollution control structure. Primary control structures include four sediment impoundments, four diversion ditches and miscellaneous berms. The locations of these structures can be viewed on Drawing 5-3. The detailed analysis for these structures and specific designs can be viewed on Drawings 5-25 through 5-34. In addition, a geotechnical analysis of the impoundments to ensure stability can be viewed in Appendix 5-1. The watershed and structure sizing analysis can be viewed in Appendix 5-2. In addition to these primary structures, temporary diversions and impoundments may also be implemented, as necessary, in mining areas to further enhance pollution controls.

Sediment control measures will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-760. Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763. Storm water and snow melt that occurs within the facilities area will be routed to an impoundment that will contain sediment. This impoundment will have a drop-pipe spillway installed that will allow removal of any oil sheens that may result from parking lots or maintenance activities by using absorbent materials to remove the sheen. Details for this impoundment can be viewed on Drawings 5-28.

There are four sediment impoundments proposed for the permit area. These structures will be constructed using a combination of dozers and backhoes. The structures have been designed to contain the required storm events as specified in Appendix 5-2. The structures will have sediment removed as necessary to ensure the required capacities. Details for these structures can be viewed on Drawings 5-25, 5-26 and 5-28 through 5-32. Calculations and supporting text can be viewed in Appendix 5-2.

Four diversion ditches along with four sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

The smallest practicable area, consistent with reasonable and safe mine operational practices will be disturbed at any one time during the mining operation and reclamation phases. This will be accomplished through progressive backfilling, grading, and prompt revegetation of disturbed areas.

There are no other coal processing waste banks, dams or embankments proposed within the permit area.

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Diesel fuels, oils, greases, and other hydrocarbons products will be stored and used at the mine site for a variety of purposes. A spill Prevention Control and Countermeasure Plan will be implemented that will help minimize any potential detrimental impacts to the environments.

Products including potentially hazardous chemicals, fuels, and oils used in the mining process will be stored and used in a manner that minimizes the potential for these products to contaminate surface-water resources. Concrete oil and fuel containments will be constructed as shown on Drawings 5-3 and 5-8.

The wash bay at the mine site will include a closed circuit water recycle system. This system will eliminate and store water impurities and reroute water back through the wash bay for cleaning equipment, thus minimizing water consumption the potential for contamination of surface-water resources. Details for this structure can be viewed on Drawings 5-3, 5-8, and Appendix 5-4. .

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed according to R645-301-732.400, R645-301-742.400 and R645-301-762. The specific plan for road locations and design are presented in R645-301-534. The location and details for roads can be viewed on Drawings 5-3 and 5-22 through 5-24.

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed to control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area; Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R645-301-751; minimize the diminution to or degradation of the quality or quantity of surface- and ground-water systems; and refrain from significantly altering the normal flow of water in streambeds or drainage channels. No acid- or toxic-forming substances will be used in road surfacing.

All roads will be removed and reclaimed according to Drawings 5-35 and 5-36. The estimated timetable for removing these roads is shown on Drawing 5-38. Cut ditches will be established on the shoulders of all primary roads to control drainage and erosion. Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles.

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an

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annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

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Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731 and be managed according to the following.

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

If mining and reclamation activities result in the contamination, diminution, or interruption of State appropriated groundwater or surface-water sources, replacement water will be provided using the alternate water source described in R645-301-727.

731.200 Water Monitoring

This section describes the hydrologic monitoring plan. Locations of surface-water and groundwater monitoring sites are indicated on Drawing 7-10. Hydrologic monitoring protocols, sampling frequencies, and sampling sites are described in Table 7-4. Groundwater and surface-water monitoring locations are listed in Table 7-5. Operational field and laboratory hydrologic monitoring parameters for surface water are listed in Table 7-6, and for groundwater in Table 7-7. The hydrologic monitoring parameters have been selected in consultation with the Division's directive Tech-006, *Water Monitoring Programs for Coal Mines.*

The groundwater and surface-water monitoring plan is extensive and includes 54 monitoring sites. The monitoring plan is designed to monitor groundwater and surface-water resources for any potential impacts that could potentially occur as a result of

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mining and reclamation activities in the proposed Coal Hollow Mine permit and adjacent area. Each of the sampling locations and their monitoring purpose are described below.

Streams

Kanab Creek will be monitored at sites SW-3 (above the permit area), and SW-2 (below the permit area). Lower Robinson Creek will be monitored at sites SW-4 (above the permit area), SW-101 (within the permit area), and SW-5 (below the permit area above the confluence with Kanab Creek). The irrigation water near SW-4 will also be monitored at site RID-1. Swapp Hollow creek will be monitored above the permit area at site SW-8. Sink Valley Wash will be monitored at SW-6 (a small tributary to the wash immediately below the permit area) and at SW-9, located in the main drainage below the permit area. All of these locations, with the exception of RID-1) will be monitored for discharge and water quality parameters specified in Table 7-6 quarterly, when reasonably accessible. Additionally, Lower Robinson Creek will be monitored at site BLM-1, which is near the location of alluvial groundwater emergence in the bottom of the stream channel. BLM-1 and RID-1 will be monitored for discharge and field water quality parameters.

Springs

Eight springs from alluvial groundwater area A will be monitored including SP-8, SP-14, SP-16, SP-19, SP-20, SP-22, SP-24 and Sorensen Spring. Spring SP-8 is a developed spring in area A that provides culinary water for the Swapp Ranch house. SP-8 will be monitored for discharge and operational laboratory water quality measurements quarterly when reasonably accessible. Springs SP-14, SP-16, SP-19, SP-20, SP-22, SP-24 and Sorensen Spring springs will be monitored for discharge and field water quality measurements quarterly when reasonably accessible.

Springs SP-4 and SP-6, and SP-33, which are located in Sink Valley below the proposed mining area, will also be monitored. SP-6 is an area of diffuse seepage above an earthen impoundment in the wash immediately below the permit area. Spring SP-33 is a developed spring that discharges into a pond below the permit area and provides culinary water to two adjacent cabins. Each of these Springs SP-6 and SP-33 will be monitored for discharge and operational laboratory water quality measurements quarterly when reasonably accessible. SP-4 discharges from a fault/fracture system in the Dakota Formation near the canyon margin in Sink Valley Wash below the permit area. Spring SP-4 will be monitored for discharge and field water quality measurements quarterly when reasonably accessible. Spring SP-3 discharges from pediment alluvium in the upland area above Sink Valley Wash more than a mile from the permit area. It is extremely unlikely that discharge rates or water quality at this spring could be impacted

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as a result of mining-related activities in the mine permit area. However, this spring will be monitored for discharge and field water quality measurements quarterly, primarily to provide background data from springs in the region.

Wells

Wells Y-98 (Robinson Creek alluvium above the permit area), Y-45 (coal seam well in Swapp Hollow above permit area), Y-102 (flowing alluvial well in alluvial groundwater discharge area A), Y-36 (coal seam well in Sink Valley above the permit area), Y-38 (coal seam well in Sink Valley permit area), Y-61 (alluvial well at the Sorenson Ranch), and C5-130 (new monitoring well in alluvial groundwater discharge A) will be monitored quarterly when reasonable accessible. Well Y-61 will be monitored for groundwater operational laboratory water quality parameters to monitor groundwater quality in alluvial groundwater discharge area A. The other wells will be monitored for water level only.

Additionally, 19 newly constructed monitoring wells constructed in the Sink Valley alluvial groundwater system will be monitored quarterly. These include C2-15, C2-28, C2-40, C3-15, C3-30, C3-40, C4-15, C4-30, C4-50, C7-20, C9-15, C9-25, C9-40, LS-28, LS-60, LS-85, SS-15, SS-30, and SS-75. All of these wells will be monitored quarterly for water level. Additionally, wells LS-85 and SS-30 will be monitored for groundwater operational laboratory water quality measurements.

Additionally two wells in the Lower Robinson Creek alluvium will be monitored for water level and groundwater operational laboratory chemistry. These include UR-70 located above proposed mining locations in the Lower Robinson Creek drainage, and LR-45, located below proposed mining areas adjacent to Lower Robinson Creek. It should be noted that LR-45 is located near a proposed sediment pond impoundment. Consequently, if this well becomes unsuitable for monitoring, an alternate location will be used to monitor the Lower Robinson alluvial groundwater system in this area.

Wells C0-18 and C0-54 are located near the initial proposed mining areas in the Lower Robinson Creek drainage. These will be monitored for water level quarterly.

It should be noted that many of the wells specified for monitoring in this monitoring plan will at some point be destroyed or rendered inoperable as the mine workings precede through the area. These wells will be monitored until such a time as they are destroyed or become inoperable.

Groundwater and surface-water monitoring will continue through the post-mining periods until bond release. The monitoring requirements, including monitoring sites, analytical parameters and the sampling frequency may be modified in the future in consultation with the Division if the data demonstrate that such a modification is warranted.

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731.600 Stream Buffer Zones

Any perennial or intermittent streams in the mine area will be protected by 100 foot stream buffer zones on either side of these streams. Coal mining and reclamation operations will not cause or contribute to the violation of applicable Utah or federal water standards and will not adversely affect the water quality and quantity or other environmental resources of the stream.

Temporary or permanent stream channel diversion will comply with R645-301-742-300. It should be noted that the proposed Coal Hollow Mine plan calls for the permanent diversion of a reach of the Lower Robinson Creek stream channel approximately 2,000 feet in length in the southeast ¼ of Section 19, T39S, R5W. Details of the proposed diversion are given in Chapter 5, Section 527.220 of this MRP. If this action results in diminution of the meager discharge of surface water in the drainage below the planned diversion, where required a suitable mitigation for this potential impact will be designed and implemented in consultation with the Division of Oil, Gas and Mining.

The areas surrounding the streams that are not to be disturbed will be designated as buffer zones, and will be marked as specified in R645-301-521.260.

731.700 Cross sections and Maps

The locations of springs and seeps identified in the proposed Coal Hollow Mine permit and adjacent area are shown in Drawing 7-1. The locations of baseline hydrologic monitoring locations are shown on Drawing 7-2. The locations of water rights in the proposed Coal Hollow permit and adjacent area are provided on Drawing 7-3. Cross-sections depicting the stratigraphy and hydrostratigraphy of the proposed Coal Hollow Mine permit and adjacent area are presented in Chapter 6, Drawing 6-2. Designs for proposed impoundments in the proposed Coal Hollow permit area are shown in Drawings 5-25 through 5-31

731.800 Water Rights and Replacement

Alton Coal Development, LLC commits to replace the water supply of an owner of interest in real property who obtains all or part of his or her supply of water for domestic, agricultural, industrial, or other legitimate use from the underground or surface source, where the water supply has been adversely impacted by contamination, diminution, or interruption proximately resulting from the surface mining activities. Baseline hydrologic information required in R645-301-624.100 through R645-301-624.200, R645-301-625, R645-301-626, R645-301-723 through R645-301-724.300, R645-301-724.500, R645-301-725 through R645-301-731, and R645-301-731.210 through R645-301-

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731.223 will be used to determine the extent of the impact of mining upon ground water and surface water.

732 Sediment Control Measures

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Sediment control measures have been designed, constructed and maintained to prevent additional contributions of sediment to streamflow or to runoff outside the permit area.

732.100 Siltation Structures

Siltation structures within the permit area are described in Section 732.200

732.200 Sedimentation Ponds

Four diversion ditches along with four sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

Sedimentation ponds have been designed in compliance with the requirements of R645-301-356.300, R645-301-356.400, R645-301-513.200, R645-301-742.200 through R645-301-742.240, and R645-301-763.

No sedimentation ponds or earthen structures that will remain open are planned.

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The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

732.300 Diversions

The runoff control plan is designed to isolate, to the maximum degree possible, runoff from disturbed areas from that of undisturbed areas. Where possible, this has been accomplished by allowing up-stream runoff to bypass the disturbed area, and routing any runoff from undisturbed areas that enter the disturbed area into a sediment control system.

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Four diversion ditches along with four sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on

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Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

732.400 Road Drainage

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All roads will be constructed, maintained and reconstructed to comply with R645-301-742.400. Road drainage facilities include diversion ditches, culverts, containment berms, and/or water bars. Specific plans for road drainage, road construction, and road maintenance are presented in Chapter 5, Section 534 of this MRP.

A description of measures to be taken to obtain division approval for alteration or relocation of a natural drainage way will be presented to the Division when necessary.

A description of measures to be taken to protect the inlet end of a ditch relief culvert will be submitted to the Division when necessary.

All road drainage diversions will be maintained and repaired to operational condition following the occurrence of a large storm event. Culvert inlets and outlets will be kept clear of sediment and other debris.

733 IMPOUNDMENTS

733.100 General Plans

A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2.

Five impoundments are proposed to control storm water runoff and sediment from disturbed areas. Each impoundment is designed to contain the run off from a 100 year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-26. The following table summarizes the final capacity results for each impoundment:

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Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	7.7	122	1.4
4	5.7	7.5	132	1.8
1B	0.5	0.8	160	0.3

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Structure 1 is a rectangular impoundment approximately 136 feet long by 81 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 3 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6909' and 6918', respectively. The top of the embankment is at elevation 6922'. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6892' and 6904', respectively. The top of the embankment is at elevation 6906'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6889' and 6898', respectively. Top of the embankment is at elevation 6901'. Details for the design can be viewed on Drawing 5-29.

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Structure 3 is a valley fill impoundment that will impound an area approximately 484 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 198 feet wide by 229 feet long and 8 feet deep. The embankment will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. The spillway will be an open channel that will have vegetated slopes. This pond will control storm water runoff from a watershed of approximately 300 acres. The cleanout and spillway elevation are 6802' and 6810', respectively. Top of the embankment is at 6814'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately 92 feet wide by 628 feet long and 11 feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have vegetated slopes. This pond will control storm water runoff from a watershed of approximately 256 acres. The cleanout and spillway elevation are 6823' and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to be minimal based on the high clay content of the existing materials. Characterization of the soils is contained in Chapter 2. Acid and Toxic analysis of the soils indicates that water seeping through the alluvium layer will not result in reducing water quality. The acid and toxic analysis for the alluvium can be viewed in Appendix 6-2.

Hydrologic data for the permit area is provided in Appendix 7-1. This data indicates that there will be some seepage through the subsurface that may travel to adjacent drainages. The quantities for this seepage are expected to be minimal and will have minimal impact to the overall hydrologic balance. Even though seepage may occur, analysis of the soils indicates that water quality will not be diminished.

The above information provides a summary of all the impoundment structures that are proposed for the Coal Hollow Project. Detailed designs and calculations are provided in this section, Drawings 5-26 through 5-32 and Appendix 5-2. No other impoundments are anticipated.

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733.200 Permanent and Temporary Impoundments

All impoundments have been designed and constructed using current, prudent engineering practices and have been designed to comply with the requirements of R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, R645-301-733.220 through R645-301-733.226, R645-301-743.240, and R645-301-743.

No impoundments or sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) exist or are planned within the proposed Mine Permit Area. Should impoundments and sedimentation ponds meeting the size or other qualifying criteria of MSHA, 30 CFR 77.216(a) become necessary, compliance with the requirements of MSHA, 30 CFR 77.216 will be met.

All five planned impoundments have been evaluated by a professional engineer to ensure stability of each structure. The stability analysis performed resulted in a static safety factor of at least 2.2 for each structure. The details for this analysis can be viewed in Appendix 5-1.

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No permanent impoundments are planned in the project area.

If any examination or inspection discloses that a potential hazard exists, the person who examined the impoundment will promptly inform the Division according R645-301-515.200.

734 Discharge Structures

Discharge structures will be constructed and maintained to comply with R645-301-744.

The proposed impoundments are designed to temporarily store water from storm events and snow melt. Long term standing water in the impoundments is anticipated to be seasonal and sediment will be removed as necessary to provide the required storage capacities. Emergency spillways have been included in the designs to provide a non-destructive discharge route should the capacities ever be exceeded. Surveys of these impoundments will be regularly conducted to ensure that the required design capacities are available.

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 6 hour duration, 100 year storm event even though they are not expected to be used. They will be vegetated to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B and 2 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe

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spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these three impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

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735 Disposal of Excess Spoil

Areas designated for the disposal of excess spoil and excess spoil structures will be constructed and maintained to comply with R645-301-745.

Details of proposed excess spoil disposal plans are presented in Chapter 5, Section 535 of this MRP and are summarized below.

A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

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The excess spoil is planned to be placed in an area where natural grades range from 0 to 5%. This is one of the most moderately sloping locations in the Permit Area. Stability of this structure is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

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Geotechnical borings were completed in the foundation of the proposed disposal area. Laboratory analysis of these borings has also been completed. Details of this analysis can be viewed in Appendix 5-1.

Permanent slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 details the stability analysis for the proposed structure.

Excess spoil will not be disposed of in underground mine workings.

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Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

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A description of the character of the bedrock and any adverse geologic conditions in presented in Appendix 5-1.

Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

There are no historical underground mining operations in the proposed excess spoil area. There are also no future underground operations proposed.

There are no rock chimneys or drainage blankets proposed.

A stability analysis including strength parameters, pore pressures and long-term seepage conditions is presented together with all supporting data in Appendix 5-1.

Neither rock-toe buttresses nor key-way cuts are required under R645-301-535.112 or R645-301-535.113.

No valley fills or head-of-hollow fills are proposed.

No durable rock fills are proposed.

No disposal of waste on preexisting benches is planned

The excess spoil structure and fill above approximate original contour are the only alternative specifications proposed. A geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas will be restored to approximate original contour.

736 Coal Mine Waste

Areas designated for disposal of coal mine waste and coal mine waste structures will be constructed and maintained to comply with R645-301-746.

No structures for the disposal of coal mine waste are planned.

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737 Noncoal Mine Waste

Noncoal mine waste will be stored and final disposal of noncoal mine waste will comply with R645-301-747

Noncoal mine waste, including but not limited to grease, lubricants, paints, flammable liquids, garbage, machinery, lumber and other combustible materials generated during coal mining and reclamation operations will be temporarily stored in a controlled manner. Final disposal of noncoal mine wastes will consist of removal from the project area and transportation to a State-approved solid waste disposal area.

Only sizing of the coal is proposed. This process will not produce any waste.

At no time will any noncoal mine waste be deposited in a refuse pile or impounding structure, nor will any excavation for a noncoal mine waste disposal site be located within eight feet of any coal outcrop or coal storage area.

Notwithstanding any other provision to the R645 Rules, any noncoal mine waste defined as "hazardous" under 3001 of the Resource Conservation and Recovery Act (RCRA) (Pub. L. 94-580, as amended) and 40 CFR Part 261 will be handled in accordance with the requirements of Subtitle C of RCRA and any implementing regulations.

Debris, acid-forming, toxic-forming materials and materials constituting a fire hazard will be identified and disposed of in accordance with R645-301-528.330, R645-301-537.200, R645-301-542.740, R645-301-553.100 through R645-301-553.600, R645-301-553.900, and R645-301-747. Appropriate measures will be implemented to preclude sustained combustion of such materials.

Plans do not include using dams, embankments or other impoundments for disposal of coal, overburden, excess spoil or coal mine waste.

738 Temporary Casing and Sealing of Wells

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other

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material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

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If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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740 DESIGN CRITERIA AND PLANS

741 GENERAL REQUIREMENTS

742 SEDIMENT CONTROL MEASURES

742.100 General Requirements

742.110 Design

Appropriate sediment control measures will be designed, constructed and maintained using best technology currently available to prevent to the extent possible, contributions of sediment to stream flow or to runoff outside the permit area; meet the effluent limitations under R645-301-751; and minimize erosion to the extent possible.

Four diversion ditches along with five sediment impoundments are proposed for the permit area. In addition, miscellaneous controls such as silt fence and berms are also proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-3. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2. These impoundments in combination with the ditches will be the primary method that will be used to control sediment resulting from disturbed areas. In addition to the drawings and Appendix 5-2 , the following is a description of the structures:

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A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2.

Five impoundments are proposed to control storm water runoff and sediment from disturbed areas. Each impoundment is designed to contain the run off from a 100 year, 24 hour duration storm event. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-26. The following table summarizes the final capacity results for each impoundment:

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Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	7.7	122	1.4
4	5.7	7.5	132	1.8
1B	0.5	0.8	160	0.3

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Structure 1 is a rectangular impoundment approximately 136 feet long by 81 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 4 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6909' and 6918', respectively. The top of the embankment is at elevation 6922'. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6892' and 6904', respectively. The top of the embankment is at elevation 6906'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6889' and 6898', respectively. Top of the embankment is at elevation 6901'. Details for the design can be viewed on Drawing 5-29.

Structure 3 is a valley fill impoundment that will impound an area approximately 484 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 198 feet wide by 229 feet long and 8 feet deep. The embankment will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. The spillway will be an open channel that will have vegetated

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slopes. This pond will control storm water runoff from a watershed of approximately 300 acres. The cleanout and spillway elevation are 6802' and 6810', respectively. Top of the embankment is at 6814'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately 92 feet wide by 628 feet long and 11 feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have vegetated slopes. This pond will control storm water runoff from a watershed of approximately 256 acres. The cleanout and spillway elevation are 6823' and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to be minimal based on the high clay content of the existing materials. Characterization of the soils is contained in Chapter 2. Acid and Toxic analysis of the soils indicates that water seeping through the alluvium layer will not result in reducing water quality. The acid and toxic analysis for the alluvium can be viewed in Appendix 6-2.

Hydrologic data for the permit area is provided in Appendix 7-1. This data indicates that there will be some seepage through the subsurface that may travel to adjacent drainages. The quantities for this seepage are expected to be minimal and will have minimal impact to the overall hydrologic balance. Even though seepage may occur, analysis of the soils indicates that water quality will not be diminished.

Sedimentation ponds have been designed in compliance with the requirements of R645-301-356.300, R645-301-356.400, R645-301-513.200, R645-301-742.200 through R645-301-742.240, and R645-301-763.

No sedimentation ponds or earthen structures that will remain open are planned.

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The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

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The diversions ditches will be utilized to direct runoff from disturbed areas to the sediment impoundments. The channel sizing for the four proposed diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 100 year, 24 hour storm event:

Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	14.8	0.5	6.8	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.8	19.8	0.6	5.4	0.3

*All side slopes are 2h:1v

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The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

These structures will retain sediment within the disturbed area. The diversion ditches are designed in manner that will minimize erosion of the channels and will divert runoff from disturbed areas to the impoundments. These sediment control measures are designed to meet the effluent limitations under R645-301-751.

742.200 Siltation Structures

Siltation structures have been designed in compliance with the requirements of R645-301-742.

Miscellaneous controls such as silt fence and berms are proposed for specific areas. The proposed locations for these structures are shown on Drawing 5-26. Details associated with these structures can be viewed on Drawings 5-25 through 5-34 and Appendix 5-2.

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742.210 General Requirements

Additional contributions of suspended solids and sediment to streamflow or runoff outside the permit area will be prevented to the extent possible using the best technology currently available. Siltation structures for an area will be constructed before beginning any coal mining and reclamation operations in that area and, upon construction, will be

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certified by a qualified registered professional engineer to be constructed as designed and as approved in the reclamation plan. Any siltation structures which impounds water will be designed, constructed and maintained in accordance with R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, R645-301-733.220 through R645-301-733.224, and R645-301-743.

The primary controls for limiting suspended solids and sediment to stream flow and runoff outside the permit area is sediment impoundments and diversions ditches. The proposed system described in section 742.110 is designed to control storm water/runoff discharges from the disturbed areas. Discharges from this system are expected to be minimal and infrequent. Discharges that may occur will comply with R645-301-751.

The impoundment and ditch system will be inspected regularly and discharges will be sampled for water quality purposes.

742.220 Sedimentation Ponds.

742.221.1 The proposed sediment ponds are designed to be used individually

742.221.2 The locations for the sediment ponds were selected to be as near as possible to the disturbed areas and are not located in perennial streams

742.221.3 The ponds are designed and will be constructed and maintained to:

742.221.31 The ponds have been designed with excess capacity by at least 15% to allow for adequate sediment storage volume. The following table provides the design capacities in relation to a 24 hour duration, 100 year storm event:

Sedimentation Impoundment Capacities				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	7.7	122	1.4
4	5.7	7.5	132	1.8
1B	0.5	0.8	160	0.3

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These sedimentation ponds will be surveyed at least annually to ensure that sufficient sediment storage is available in the impoundment. Sediment will be removed from the ponds as required based on results from the surveys. Calculations related to these design capacities can be viewed in Appendix 5-2. Stage-Storage curves for each pond can be viewed on Drawings 5-28 through 5-31.

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742.221.32 The sedimentation ponds are designed to provide detention for a 100 year, 24 hour duration storm event. Calculations for this design can be viewed in Appendix 5-2. This design standard is expected to keep discharges from the structure at a minimum and allow adequate settlement time to meet Utah and federal effluent limitations.

742.221.33 The sedimentation ponds are designed for a 100 year, 24 hour storm event which significantly exceeds a 10 year, 24 hour precipitation event. The 100 year, 24 hour event in the Alton area is 3.1 inches of precipitation. The 10 year, 24 hour precipitation event in this same location is approximately 2.0 inches of precipitation. The design standard used for the Coal Hollow project is 155% of the precipitation for the required "design event".

742.221.34 Each pond will be constructed with an emergency spillway, should the capacities of the ponds ever be exceeded. These spillways will provide a nondestructive route for storm water discharge, though the capacities of the ponds are not expected to be exceeded. The design capacities of the ponds are expected to contain each storm event and therefore will provide sufficient detention time to meet Utah and federal effluent limitations. The following is a description of each spillway:

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 24 hour duration, 100 year storm event even though they are not expected to be used during normal operations. They will be vegetated to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B and 2 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these two impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

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742.221.35 Regular inspections of the sediment pond system during construction and operations will identify any deficiencies that could cause short circuiting. Design standards for the system will ensure proper functioning during extreme storm events which makes it highly unlikely that issues related to short circuiting could occur during normal operations.

742.221.36 Surveys of the pond system will be conducted at least annually. These surveys will be compared against the required "design event" capacity for each pond. Sediment removal will occur as needed to maintain the required capacity.

742.221.37 Geologic conditions in the areas where sediment ponds will be constructed are suitable to the proposed use. Excessive settling of the ponds is not expected based on the high clay content of the soils. Embankments will be constructed in maximum two foot lifts to promote compaction during the construction process, reducing settling during operations. Supporting data for compaction can be viewed in Appendix 5-1.

742.221.38 Any sod, large roots, and/or frozen soil will be removed from sedimentation ponds. No coal processing will be conducted as part of the Coal Hollow Project; therefore wastes from this type of process will not be present.

742.221.39 Embankments will be constructed in maximum two foot lifts to promote compaction during the construction process, reducing settling during operations. Supporting data for this compaction method can be viewed in Appendix 5-1.

742.222 Sedimentation ponds for the Coal Hollow Project do not meet the size or other qualifying standard for MSHA, 30 CFR 77.216(a).

742.223 Each sedimentation pond will be constructed with a spillway that will function as both the emergency and principle spillway. Each of these spillways will safely discharge a 25 year, 6 hour precipitation event. The following table summarizes the spillway discharge designs in relation to the 25 year, 6 hour precipitation event:

Sediment Impoundment – Spillway Flow Capacities		
Impoundment	Required Spillway Discharge (cfs)	Designed Spillway Discharge (cfs)
1	30.4	37.4
2	0.8	30.5
3	2.8	11.5
4	2.4	11.5
1B	6.06	23.9

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The drop pipe spillways for impoundments 1, 1B and 2 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be grass lined and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected.

742.224 Either the requirements of 742.223.1 or 742.223.2 will be met for each sediment impoundment.

742.225 No exceptions to the sediment pond location guidance are requested

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742.230 Other Treatment Facilities

If other treatment facilities become necessary, they will be designed to treat the 10-year, 24-hour precipitation event unless a lesser design event is approved by the Division based on terrain, climate, other site-specific conditions and a demonstration by the operator that the effluent limitations of R645-301-751 will be met.

No other treatment facilities are planned for the Coal Hollow Project.

742.240 Exemptions

Not Applicable

742.300 Diversions

742.310 General Requirements

742.311 There are no flows from mined areas that have been abandoned prior to May 3, 1978 at the Coal Hollow Project. Diversions at the Coal Hollow Project are planned to minimize water from disturbed areas from directly discharging into drainages without first being treated and to also prevent water from upland, adjacent areas from entering the project area. Four temporary diversion ditches are planned and one temporary diversion of Lower Robinson Creek. Two diversions will be primarily used to route water from upland, undisturbed areas away from the planned disturbed areas. Two diversions are planned to direct water from disturbed areas into sediment impoundments. The temporary diversion of Lower Robinson Creek is for maximum recovery of coal and will route flows around the mining area. Each temporary diversion has been designed to only carry runoff from areas that will or potentially could be affected by the mining operations, except Lower Robinson Creek diversion which will carry intermittent flows from the upstream watershed. Diversion locations were selected to generally carry runoff to the drainage paths

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that the precipitation would originally follow. These parameters were followed in the designs to minimize impacts to the overall hydrological balance within the permit and adjacent areas. Diversions will not be used to route water into underground mines. Specific design parameters are discussed in the following sections (R645-301-742.312.1 to 742.314).

742.312 Each diversion was designed to ensure stability and to minimize erosion. In order to accomplish this standard, the diversions were each designed for peak flows during a 100 year, 24 hour storm event. The following summarizes the steps used:

The channel sizing for the four proposed temporary diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 100 year, 24 hour storm event:

Diversion Ditch Summary

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Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	14.8	0.5	6.8	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.8	19.8	0.6	5.4	0.3

*All side slopes are 2h:1v

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As shown in the above table, flow depths will be shallow, flow velocity will be manageable for temporary flow conditions and sufficient freeboard will be present during a flood event. These conditions will provide diversion stability, protection against flooding and prevent to the extent possible additional contributions of suspended solids to streamflow outside the permit area. These diversions are designed to comply with all applicable local, Utah and federal laws and regulations. Further details related to the temporary diversion designs can be viewed in Appendix 5-2.

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Based on the size of the watershed for Lower Robinson Creek, a different method of analysis was used than the method used for the other diversions. The HEC-1 program was used for this analysis and extra erosion protection has been included as part of the design. The channel was designed to safely handle the flows from a 100 year, 6 hour storm event. This diversion will be further discussed in section 742.320 Diversion of Perennial and Intermittent Streams.

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742.313 The four temporary diversions will be reclaimed when they are no longer necessary. This will occur once final reclamation is determined to be sufficient within the project area and the sediment impoundments are no longer needed. This is anticipated to occur in the fourth year of operations.

The Lower Robinson Creek temporary diversion will be constructed in a responsible manner. This diversion will experience some erosion during flood events but erosion rates are expected to be generally less than those in the original channel above and below the diversion. The detailed design for this diversion can be viewed in Drawings 5-20 and 21. Calculations related to this diversion design can be viewed in Appendix 5-3.

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742.320 Diversion of Perennial and Intermittent Streams.

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742.321 Temporary diversion of one intermittent stream is planned for the Coal Hollow Project. The planned diversion is in a length of the stream that appreciable flows only occur during storm events and snow melt periods. This diversion is necessary to recover coal located in the northwest corner of the project area. The diversion would provide mining in an area that is 22 acres and contains approximately 400,000 tons of recoverable coal. Without this diversion, most of this area could not be mined.

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742.322 The original unmodified channel immediately upstream and downstream from the Lower Robinson Creek diversion has excessive erosion and is not in stable condition. The channel has incised deeply and has developed into a channel that has a capacity significantly greater than any anticipated storm events. Since these conditions are not desirable for the area, the diversion design instead has dimensions that are suitable to pass a 100 year, 6 hour storm event in compliance with R645-301-742.323.

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742.323 The temporary Lower Robinson Creek diversion has been designed to safely pass a 100 year, 6 hour storm event. The watershed for this drainage is 3.64 square miles and has a peak flow of 83.5 cubic feet per second during a 100 year, 6 hour event. Minimum dimensions for carrying this flow was found to be a channel that has the following dimensions:

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Bottom width: 2 feet
Side slopes: 3h:1v
Minimum slope height: 3 feet (1 foot freeboard added)

Details related to the design calculations are provided in Appendix 5-3. Rip-rap will be appropriately placed to minimize erosion of the channel.

Cross sections of the channel design are shown in Drawing 5-21. As shown in the drawing, all sections of the diversions exceed the minimum design standard. A plan view of the diversion design can be viewed in Drawing 5-20.

742.324 Design of the Lower Robinson Creek Diversion has been certified by a qualified registered professional engineer.

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742.330 Diversion of Miscellaneous Flows.

742.323

As part of the reclamation process, Lower Robinson Creek will be reconstructed to its approximate original location. The design for this reconstruction is shown on Drawings 5-20A and 5-21A. This design includes considerable improvements to the channel compared to the channel's current condition. The current condition is such that less than 25% of the channel within the disturbed area has a flood plain present and most of the slopes are near the angle of repose with fair to poor vegetative cover. The reconstructed sides of the channel for the entire length reconstructed. Sharp corners in the original alignment have been rounded to sinuous curve shapes and rip-rap will be installed in the bottom section of the channel to minimize erosion. The flood plain will be seeded and covered with erosion matting to control erosion until natural vegetative condition can be attained.

742.331 Diversion of miscellaneous flows is planned using four diversion ditches. Two diversions will be primarily used to route runoff from upland, undisturbed areas away from the planned disturbed areas. Two diversions are planned to direct runoff from disturbed areas into sediment impoundments. The locations of these diversions along with the associated watersheds can be viewed on Drawings 5-27, 5-33 and 5-34. Calculations related to the diversions can be viewed in Appendix 5-2.

742.332 Each diversion was designed for stability and to minimize erosion. In order to accomplish this standard, the diversions were each designed for peak flows during a 100 year, 24 hour storm event. The following summarizes the steps used:

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The channel sizing for the four proposed temporary diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on peak flows during a 100 year, 24 hour storm event:

Diversion Ditch Summary

Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	14.8	0.5	6.8	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.8	19.8	0.6	5.4	0.3

*All side slopes are 2h:1v

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As shown in the above table, flow depths will be shallow, flow velocity will be manageable for temporary flow conditions and sufficient freeboard will be present during a flood event. These conditions will provide diversion stability, protection against flooding and prevent to the extent possible additional contributions of suspended solids to stream flow outside the permit area. These diversions are designed to comply with all applicable local, Utah and federal laws and regulations. Further details related to the temporary diversion designs can be viewed in Appendix 5-2.

742.333 All four miscellaneous flow diversions planned for the project are temporary and will be reclaimed when no longer necessary for sediment and storm water control. Therefore, the channels must safely pass the peak runoff from a 2 year, 6 hour event. As previously described, these diversions have been designed to pass a 100 year, 24 hour storm event which significantly exceeds this required design standard. Precipitation from a 100 year, 24 hour storm event for this area is 3.1 inches while precipitation for the 2 year, 6 hour event is less than 1 inch.

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742.400 Road Drainage

742.410 All Roads

742.411 To ensure environmental protection and safety appropriate for the planned duration and use, limits have been incorporated in the road designs for the Coal Hollow Project. These limits are applied to drainage control and culvert placement/sizing. These limits take into consideration the type and size of equipment planned for the operation. The following is a description of roads along with the design limits and standards that will be incorporated into construction:

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Two primary Mine Haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits 1 through 15 (pits shown on Drawing 5-10). This road will be approximately 2,600 feet in length and will be utilized mainly during the first two years of mining. There will be three culverts installed along this road all sized for a 100 year, 6 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix 5-3. The third culvert is a crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

The second road extends from an intersection with the first road, located just south of the Lower Robinson Creek crossing, and proceeds south to approximately pit 25. This road is approximately 2,500 feet in length and will be used for the south pits 16 through 30. There is one culvert crossing along this road to cross a diversion ditch. This culvert will be a 24 inch culvert.

The following specifications apply to these two Primary Mine Haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5h:1v

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6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The ancillary roads will have similar specifications except surfacing will occur only as needed and may be narrowed to a 40 foot road width.

The location and details for all these roads can be viewed on Drawings 5-3 and 5-22 through 5-24.

In addition to the two primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road system will have four culverts and selectively located berms to appropriately route water to the two sediment impoundments for the facilities area. The location of these culverts and berms is shown on Drawing 5-3. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

The ramps, benches and equipment travel paths within the active surface mining area are temporary in nature and will be relocated frequently as mining progresses. These temporary travelways are considered part of the pit due to their short term use, and are not individually designed nor engineered. They will be built and maintained to facilitate safe and efficient mine and reclamation operations.

All roads will be maintained on an as needed basis using motor graders, water trucks for dust suppression, and other equipment as necessary. Crushed stone and/or gravel will be used as a surface course for primary roads outside the active mining area, and may be used as needed for ramps and travelways within the pit. Should the roads be damaged by a catastrophic event, such as an earthquake or a flood, repairs will be made as soon as possible after the damage has occurred or the road will be closed and reclaimed.

Cut and fill slopes along the primary roads will be minimal and are not expected to cause significant erosion. The water from roads in the project area will not directly discharge to drainages outside the project area without first being treated by flowing through a sediment impoundment. In locations where there are culvert crossings (i.e. Lower Robinson Creek), the fills slopes will be stabilized by utilizing standard methods such as grass matting or straw wattles.

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742.412 No roads will be located in the channel of an intermittent or perennial stream.

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742.413 Primary roads constructed utilized during mining operations have been designed and located to route runoff from the roads to the sediment impoundment system. By routing the runoff to this system, sedimentation and flooding downstream resulting from the roads will be minimized. All other roads located within the active mining area will also follow this standard and runoff from the roads will not be directly discharged to drainages outside the permit area.

742.420 Primary Roads

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742.421 To minimize erosion, primary roads will be constructed with a rock surface with minimal cut and fill slopes. These roads are located in the most practicable, stable areas within the permit boundary and mostly outside of the designed pits. These locations can be reviewed on Drawing 5-22 through 5-22G. Further descriptions of these roads can be viewed in Section 742.423.1 and 742.111.

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742.422 There are no stream fords by primary roads at the Coal Hollow Project.

742.423 Drainage Control

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- 742.423.1 Two primary Mine Haul roads are planned within the permit area. The first road extends from the coal unloading area to the first series of pits along the west side of the property. This road will be utilized for access to pits 1 through 15 (pits shown on Drawing 5-10). This road will be approximately 2,600 feet in length and will be utilized mainly during the first two years of mining. There will be three culverts installed along this road all sized for a 100 year, 24 hour storm event. The first culvert will be across a tributary of Lower Robinson Creek and will be a 36 inch corrugated steel pipe. The second culvert is the main crossing over Lower Robinson Creek and is a 96 inch corrugated steel pipe. Both of these culverts have been sized based on analysis of the Lower Robinson Creek watershed. This analysis can be viewed in Appendix A5-3. The third culvert is crossing over a diversion ditch that will route water mainly from disturbed areas along the south side of Lower Robinson Creek to a sediment impoundment. This culvert will be a 24 inch corrugated steel pipe.

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The second road extends from an intersection with the first road, located just south of the Lower Robinson Creek crossing, and proceeds south to approximately pit 25. This road is approximately 2,500 feet in length and will be used for the south pits 16 through 30. There is one culvert crossing along this road to cross a diversion ditch. This culvert will be a 24 inch culvert sized for maximum anticipated flows in the diversion.

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The following specifications apply to these Primary mine haul roads:

1) Roads will be approximately 80' in width
2) Approximately a 2% crown
3) Approximately one foot deep cut ditches along shoulders for controlling storm water
4) 18" of crushed rock or gravel for road surfacing
5) Cut and fill slopes of 1.5 h:1v
6) Minimum fill over each culvert will be 2 times diameter of culvert
7) Berms placed as necessary along fills

The location and details for Primary Mine Haul roads can be viewed on Drawings 5-3 and 5-22 and 5-23.

In addition to the two roads primary Mine Haul roads, the road located within the facilities area is also classified as a primary road. This road is planned to be 24 feet wide with 24 inches of compacted sub base and 8 inches of compacted 1 inch minus gravel as surfacing. This road system will have four culverts and selectively located berms appropriately placed to route water to the two sediment impoundments for the facilities area. The location of these culverts and berms is shown on Drawing 5-3. This road is referred to as "Facilities Roadway" and more details are described in 527.200 along with Drawings 5-22A and 5-22B.

In addition to the primary roads that will be present during active mining, four additional roads are planned to exist postmining and are also classified as primary roads for this reason.

Roads that will remain postmining are the following:

- Road to Water Well with details shown on Drawing 5-22D
- Road to east C. Burton Pugh property with details shown on Drawing 5-22C
- County Road 136 (K3900) with details on Drawing 5-22E, 5-22F and 5-22G. This County road will be reconstructed within the permit area by Kane County. This reconstruction will occur concurrently with the final stage of reclamation as scheduled on Drawing 5-38 and is expected to be completed by the end of Year 4.
- Road to Swapp Ranch (same specification as the Water Well Road)

The location of these roads is shown on Drawings 5-35 and 5-37 along with the post mining topography. With the exception of the County Road, each road will be graded to complement the surrounding topography and drainages. Details for these roads are provided in the above referenced drawings.

County Road 136 will have a cut ditch on the up gradient side of the road as appropriate. The culvert located at the crossing of Lower Robinson Creek will remain. One culvert will be added at Station 21+66 as shown on Drawing 5-22E.

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For further details related to reestablishment of County Road 136, refer Drawings 5-22 through 5-22G and 5-35.

742.423.2 Drainage pipes and culverts will be constructed on a minimum 2% grade to avoid plugging. Minimum fill over culverts will be 2 times the diameter of the culvert itself to avoid collapsing. Grades going in and out of each culvert will be similar to the grade of the culvert itself to avoid erosion at the inlet and outlet.

742.423.3 Drainage ditches have been designed to pass a 100 year 24 hour storm event which will prevent uncontrolled drainage over the road surface and embankment. The watersheds associated with drainage in the project area are each relatively small (less than 400 acres) and are not expected to sustain flows that would carry significant debris through the project area. Therefore, trash racks and debris basins are not expected to be necessary at the Coal Hollow Project.

742.423.4 One natural intermittent stream channel is planned to be diverted. This channel is referred to as Lower Robinson Creek and this diversion will be temporary. A section of this stream runs across an area that is planned for mining.

The Lower Robinson Creek diversion has been designed to safely pass a 100 year, 6 hour storm event. The watershed for this drainage is 3.64 square miles and has a peak flow of 83.5 cubic feet per second during a 100 year, 6 hour event. Minimum dimensions for carrying this flow were found to be a channel that has the following dimensions:

Bottom width: 2 feet
Side slopes: 3h:1v
Minimum slope height: 3 feet (1 foot freeboard added)

Details related for the design calculations are provided in Appendix 5-3. Rip-rap will be appropriately placed to minimize erosion of the channel.

Cross sections of the channel design are shown in Drawing 5-21. As shown in the drawing, all sections of the diversions exceed the minimum design standard. A plan view of the diversion design can be viewed in Drawing 5-20. This diversion design is in accordance with R645-301-731.100 through R645-301-731.522, R645-301.600, R645-301-731.800, R645-301-742.300, and R645-301-751.

Design of the Lower Robinson Creek Diversion has been certified by a qualified registered professional engineer.

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742.423.5 All stream crossings are planned to be culverts designed to pass the 100 year, 6 hour storm event. There are no plans to use fords as stream crossings.

743 IMPOUNDMENTS

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743.100 General Requirements

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Five temporary impoundments are planned at the Coal Hollow Project. Design for these structures are shown in Drawings 5-28 through 5-32. These impoundments do not meet the criteria for Class B or C dams as specified in the U.S. Department of Agriculture, Natural Resources Conservation Service Technical Release 60.

743.110 None of the impoundments meet the criteria of MSHA, 30 CFR 77.216(a).

743.120 A professional engineer experienced in the design and construction of impoundments with assistance from a geotechnical expert has used current, prudent, engineering practices to design the proposed impoundments.

The plans have been certified and a detailed geotechnical analysis has been provided in Appendix 5-1. The certifications, drawings and cross sections can be viewed in Drawings 5-25 through 5-31 and Appendices 5-1 and 5-2.

Each impoundment is designed with a minimum freeboard of 2 feet. Based on the size of the impoundments and the relatively small size of the associated watersheds, this amount of freeboard will be sufficient to prevent overtopping from waves and/or storm events. These impoundments do no meet the criteria for Class B or C dams.

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Each impoundment will be constructed with a spillway that will function as both the emergency and principle spillway. Each of these spillways will safely discharge a 25 year, 6 hour precipitation event. The following table summarizes the spillway discharge designs in relation to the 25 year, 6 hour precipitation event:

Sediment Impoundment – Spillway Flow Capacities		
Impoundment	Required Spillway Discharge (cfs)	Designed Spillway Discharge (cfs)
1	30.4	37.4
2	0.8	30.5
3	2.8	11.5
4	2.4	11.5
1B	6.06	23.9

The drop pipe spillways for impoundments 1, 1B and 2 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be grass lined

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and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected.

The impoundments at the Coal Hollow project do not meet the criteria for either Class B or C dams or MSHA CFR 77.216 (a).

743.140

A professional engineer or specialist experienced in the construction of impoundments will inspect impoundments. Inspections will be made regularly during construction, upon completion of construction, and at least yearly until removal of the structure or release of the performance bond. The qualified registered professional engineer will promptly, after each inspection, provide to the Division, a certified report that the impoundment has been constructed and maintained as designed and in accordance with the approved plan and the R645 Rules. The report will include discussion of any appearances of instability, structural weakness or other hazardous conditions, depth and elevation of any impounded waters, existing storage capacity, any existing or required monitoring procedures and instrumentation and any other aspects of the structure affecting stability. A copy of the report will be retained at or near the mine site.

The MRP does not contemplate construction of any impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216.

743.200

No permanent impoundments are planned.

743.300

Design capacities for spillways exceed the 25 year, 6 hour event. The design capacities are provided in the table located in section R645-301-743.130.

744 DISCHARGE STRUCTURES

744.100

Each pond will be constructed with an emergency spillway, should the capacities of the ponds ever be exceeded. These spillways will provide a nondestructive route for storm water discharge, though the capacities of the ponds are not expected to be exceeded. The design capacities of the ponds are expected to contain each storm event and therefore will provide sufficient detention time to meet Utah and federal effluent limitations. The following is a description of each spillway:

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Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 24 hour duration, 100 year storm event even though they are not expected to be used during normal operations. They will be vegetated to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B and 2 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these two impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

The drop pipe spillways for impoundments 1, 1B and 2 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be grass lined and are designed to carry short-term, infrequent flows at non erosive velocities where sustained flows are not expected. These designs will minimize erosion and disturbance to the hydrologic balance.

Details related to these designs can be viewed in Drawings 5-28 through 5-32.

744.200

Standard engineering design procedures have been used in the design of the discharge structures along with standard mining industry best management practices that are commonly used at surface mining operations.

745 Disposal of Excess Spoil

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745.100 General Requirements

Excess spoil will be placed in designated disposal areas within the permit area, in a controlled manner to minimize the adverse effects of leachate and surface water runoff from the fill on surface and ground waters; ensure permanent impoundments are not located on the completed fill. Small depressions may be created if approved by the Division if they are needed to retain moisture or minimize erosion, create and enhance wildlife habitat or assist revegetation, and if they are not incompatible with the stability of the fill; and adequately cover or treat excess spoil that is acid- and toxic-forming with nonacid nontoxic material to control the impact on surface and ground water is

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accordance with R645-301-731.300 and to minimize adverse effects on plant growth and the approved postmining land use.

If the disposal area contains springs, natural or manmade water courses or wet weather seeps, the fill design will include diversions and underdrains as necessary to control erosion, prevent water infiltration into the fill and ensure stability.

Details of proposed excess spoil disposal plans are presented in Chapter 5, Section 535 of this MRP and are summarized below.

A geotechnical analysis has been completed for the proposed excess spoil structure. This analysis estimates the long-term safety factor to be 1.6 to 1.7 based on the proposed design. Following proper construction practices of building the structure in maximum four foot lifts and meeting 85% compaction based on the standard Procter will ensure that the structure will be stable under all conditions of construction. This construction will occur only in the designated excess spoil area as shown on Drawing 5-3 and 5-35. The fill will be placed with end dump haul trucks and lifts will be constructed using dozers. High precision GPS systems will be regularly utilized to check grades and appropriate lift thickness. The geotechnical analysis for this structure can be viewed in Appendix 5-1.

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The excess spoil is planned to be placed in an area where natural grades range from 0 to 5%. This is one of the most moderately sloping locations in the Permit Area. Stability of this structure is estimated to be 1.6 to 1.7 based on the Appendix 5-1.

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Geotechnical borings were completed in the foundation of the proposed disposal area. Laboratory analysis of these borings has also been completed. Details of this analysis can be viewed in Appendix 5-1.

Permanent slopes for the proposed excess spoil will not exceed 3h:1v (33 percent), therefore no keyway cuts have been proposed in the design. Appendix 5-1 details the stability analysis for the proposed structure.

Excess spoil will not be disposed of in underground mine workings.

Horizontal lifts will not exceed four feet in thickness unless otherwise approved by the Division. The lifts will be concurrently compacted to meet 85% of the standard Procter. The geotechnical analysis (Appendix 5-1), provides information showing that these construction standards will provide mass stability and will prevent mass movement during and after construction. The excess spoil will be graded to provide drainage similar to original flow patterns. Topsoil and subsoil as designated in Chapter 2 will be removed and separated from other materials prior to placement of spoil.

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A description of the character of the bedrock and any adverse geologic conditions in presented in Appendix 5-1.

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Spring and seep survey information is provided on Drawing 7-1. There are no springs or seeps identified in the excess spoil area.

There are no historical underground mining operations in the proposed excess spoil area. There are also no future underground operations proposed.

There are no rock chimneys or drainage blankets proposed.

A stability analysis including strength parameters, pore pressures and long-term seepage conditions is presented together with all supporting data in Appendix 5-1.

Neither rock-toe buttresses nor key-way cuts are required under R645-301-535.112 or R645-301-535.113.

No valley fills or head-of-hollow fills are proposed.

No durable rock fills are proposed.

No disposal of waste on preexisting benches is planned

The excess spoil structure and fill above approximate original contour are the only alternative specifications proposed. A geotechnical analysis has been completed for this proposal and can be viewed in Appendix 5-1. All other mined areas will be restored to approximate original contour.

745.200 Valley Fills and Head-of-Hollow Fills

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Valley fills and head-of-hollow fills are not anticipated in the Coal Hollow Mine permit area.

745.300. Durable Rock Fills.

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Durable rock fills are not anticipated in the proposed Coal Hollow Mine permit area.

745.400. Preexisting Benches.

The disposal of excess spoil through placement on preexisting benches is not anticipated in the proposed Coal Hollow Mine permit area.

746. COAL MINE WASTE

746.100. General Requirements.

No coal mine waste is anticipated.

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746.200. Refuse Piles.

No refuse piles associated with coal mine waste are anticipated.

Deleted: Not applicable¶

746.300. Impounding structures.

No impounding structures associated with coal mine waste are anticipated.

Deleted: Not applicable¶

746.330. Drainage control.

No coal mine waste and associated drainage control is anticipated.

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746.400. Return of Coal Processing Waste to Abandoned Underground Workings.

No coal mine waste is anticipated, nor are any underground workings planned.

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747. DISPOSAL OF NONCOAL WASTE

747.100

Noncoal mine waste, including but not limited to grease, lubricants, paints, flammable liquids, garbage, machinery, lumber and other non combustible materials generated during coal mining and reclamation operations will be temporarily placed in covered dumpsters. This waste will be regularly removed from the project area and disposed of at a state approved solid waste disposal site outside the project area.

747.200

Noncoal mine waste will be stored in a metal, covered dumpster which will prevent storm precipitation or runoff from coming in contact with the waste.

747.300

No noncoal mine waste will be disposed of within the permit area.

748. Casing and Sealing of Wells.

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Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water

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wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of

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abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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750 PERFORMANCE STANDARDS

All coal mining and reclamation operations will be conducted to minimize disturbance to the hydrologic balance within the permit and adjacent areas, to prevent material damage to the hydrologic balance outside the permit area and support approved postmining land uses in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302. Mining operations will be conducted to assure the protection or replacement of water rights in accordance with the terms and conditions of the approved permit and the performance standards of R645-301 and R645-302.

751. Water Quality Standards and Effluent Limitations.

Discharges of water from areas disturbed by coal mining and reclamation operations will be made in compliance with all Utah and federal water quality laws and regulations and with effluent limitations for coal mining promulgated by the U.S. Environmental Protection Agency set forth in 40 CFR Part 434.

Discharges from the Coal Hollow project are expected to be minimal based on the storm water and runoff controls that are described in R645-301-740. These structures are designed to contain large storm events without discharging runoff. Any runoff that does discharge will be treated through the sediment pond system.

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752. Sediment Control Measures

Sediment control measures will be located, maintained, constructed and reclaimed according to the plans and designs given under sections R645-301-732, R645-301-742 and R645-301-760. Plans and designs are described in these sections.

752.100
Siltation structures and diversions will be located, maintained, constructed and reclaimed according to plans and designs given under R645-301-732, R645-301-742 and R645-301-763. Plans and designs are described in these sections.

752.200. Road Drainage

Roads will be located, designed, constructed, reconstructed, used, maintained and reclaimed according to R645-301-732.400, R645-301-742.400 and R645-301-762 and to achieve the following:

Control or prevent erosion, siltation and the air pollution attendant to erosion by vegetating or otherwise stabilizing all exposed surfaces in accordance with current, prudent engineering practices;

Control or prevent additional contributions of suspended solids to stream flow or runoff outside the permit area;

Neither cause nor contribute to, directly or indirectly, the violation of effluent standards given under R645-301-751;

Minimize the diminution to or degradation of the quality or quantity of surface- and ground-water systems; and

Refrain from significantly altering the normal flow of water in streambeds or drainage channels.

All plans and designs to meet these standards are described in the above referenced sections and on Drawings 5-22 through 5-24.

753. Impoundments and Discharge Structures

Impoundments and discharge structures will be located, maintained, constructed and reclaimed to comply with R645-301-733, R645-301-734, R645-301-743, R645-301-745 and R645-301-760. Plans and designs are described in these sections.

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754. Disposal of Excess Spoil, Coal Mine Waste and Noncoal MineWaste.

Disposal areas for excess spoil, coal mine waste and noncoal mine waste will be located, maintained, constructed and reclaimed to comply with R645-301-735, R645-301-736, R645-301-745, R645-301-746, R645-301-747 and R645-301-760. Plans and designs are described in these sections.

755. Casing and Sealing of Wells

All wells will be managed to comply with R645-301-748 and R645-301-765. Water monitoring wells will be managed on a temporary basis according to R645-301-738.

Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

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If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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760. RECLAMATION

761. GENERAL REQUIREMENTS

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Before abandoning a permit area or seeking bond release, the mine will ensure that all temporary structures are removed and reclaimed, and that all permanent sedimentation ponds, diversions, impoundments and treatment facilities meet the requirements of R645-301 and R645-302 for permanent structures, have been maintained properly and meet the requirements of the approved reclamation plan for permanent structures and impoundments. The mine will renovate such structures if necessary to meet the requirements of R645-301 and R645-302 and to conform to the approved reclamation plan.

762. ROADS

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A road not to be retained for use under an approved postmining land use will be reclaimed immediately after it is no longer needed for coal mining and reclamation operations, including restoring the natural drainage patterns, and reshaping all cut and fill slopes to be compatible with the postmining land use and to complement the drainage pattern of the surrounding terrain.

The post mining land configuration is shown on 5-35 along with postmining road locations. Cuts and fills for the reclaimed roads will be minimal which allows for minor construction to grade roads to the approximate landform that existed prior to disturbance.

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763. SILTATION STRUCTURES

763.100.

Siltation structures will be maintained until removal is authorized by the Division and the disturbed area has been stabilized and revegetated. In no case will the structure be removed sooner than two years after the last augmented seeding.

All impoundments will be reclaimed at the end of operations. The estimated timeline for removal of these structures are shown on Drawing 5-38. Expected removal is year four of the mining and reclamation process. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

763.200.

When the siltation structure is removed, the land on which the siltation structure was located will be regraded and revegetated in accordance with the reclamation plan and R645-301-358, R645-301-356, and R645-301-357.

No permanent sedimentation impoundments are planned.

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764. STRUCTURE REMOVAL

The application will include the timetable and plans to remove each structure, if appropriate.

All impoundments will be reclaimed at the end of operations. The estimated timeline for removal of these structures are shown on Drawing 5-38. Expected removal is year four of the mining and reclamation process. In areas where soils are not stabilized following the removal of these sediment impoundments, silt fence will be appropriately installed and maintained to provide sediment control until stable conditions are met.

The facilities will be fully reclaimed at the end of mining operations with the exception of the water well shown on Drawing 5- 8B. The final contour for this area can be viewed on Drawing 5-35.

The reclamation sequence and final landform can be viewed on Drawings 5-35 and 5-38.

765. PERMANENT CASING AND SEALING OF WELLS

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Wells constructed for monitoring groundwater conditions in the proposed Coal Hollow Mine permit and adjacent area, including exploration holes and boreholes used for water wells or monitoring wells, will be designed to prevent contamination of groundwater and surface-water resources and to protect the hydrologic balance. A diagram depicting typical monitoring well construction methods is shown in Drawing 7-11. Monitoring wells will include a protective hydraulic seal immediately above the screened interval, an annular seal plugging the borehole above the hydraulic seal to near the ground surface, and a concrete surface seal extending from the top of the hydraulic seal to the ground surface which is sloped away from the well casing to prevent the entrance of surface flows into the borehole area. Well casings will protrude above the ground surface a sufficient height so as to minimize the potential for the entrance of surface water or other material into the well. A steel surface protector with a locking cover will be installed at monitoring wells to prevent access by unauthorized personnel. Where there is potential for damage to monitoring wells, the wells will be protected through the use of barricades, fences, or other protective devices. These protective devices will be periodically inspected and maintained in good operating conditions. Monitoring wells will be locked in a closed position between uses.

When no longer needed for monitoring or other use approved by the Division upon a finding of no adverse environmental or health and safety effects, or unless approved for transfer as a water well under R645-301-731.100 through R645-301-731.522 and R645-301-731.800, each well will be capped, sealed, backfilled, or otherwise properly managed, as required by the Division in accordance with R645-301-529.400, R645-301-631.100, and R645-301-748. Permanent closure measures will be designed to prevent access to the mine workings by people, livestock, fish and wildlife, machinery and to keep acid or other toxic drainage from entering ground or surface waters.

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Water wells less than thirty feet deep are not regulated by the Utah Division of Water Rights. The permanent closure and abandonment of water wells less than 30 feet deep will be accomplished by filling the well casing with neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other appropriate materials. The well casing will then be cut off below the ground surface and native materials placed over the abandoned well site.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

Permanent closure and abandonment of water wells greater than 30 feet in depth will be in accordance with the requirements of "Administrative Rules for Water Well Drillers", State of Utah, Division of Water Rights or other applicable state regulations. Abandonment of wells will be performed by a licensed water well driller. The wells to be abandoned will be completely filled using neat cement grout, sand cement grout, unhydrated bentonite, or bentonite grout, or other materials approved by the Utah State Engineer's office. Alternatively, the well may be abandoned using a different procedure upon approval from the Utah State Engineer's office.

Abandonment materials will be introduced at the bottom of the well or required sealing interval and placed progressively upward to the top of the well. The casing will be severed a minimum of 2 feet below the ground surface. A minimum of 2 feet of compacted native material will be placed above the abandoned well upon completion.

Within 30 days of the completion of well abandonment procedures, a report will be submitted to the State Engineer by the responsible licensed driller giving data related to the abandonment of the well. This shall include the name of the licensed driller or other person(s) performing abandonment procedures, name of well owner at the time of abandonment, the address or location of the well by section, township, and range, abandonment materials and equipment used, water right or file number covering the well, the final disposition of the well, and the date of completion.

Exploration holes and boreholes will be backfilled, plugged, cased, capped, sealed, or otherwise managed to prevent acid or toxic contamination of water resources and to minimize disturbance to the prevailing hydrologic balance. Exploration holes and boreholes will be managed to ensure the safety of people, livestock, fish and wildlife, and machinery.

If a water well is exposed by coal mining and reclamation operations, it will be permanently closed unless otherwise managed in a manner approved by the Division.

If any exploration boreholes are to be used as monitoring wells or water wells, these will meet the provisions of R645-301-731

Boreholes will be backfilled to within 1 foot of the land surface with concrete or other materials approved by the Division as necessary to prevent contamination of groundwater or surface-water resources or to protect the prevailing hydrologic balance. The upper

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approximately 1 foot will be backfilled with native materials to facilitate reclamation (see Drawing 6-11). Exploration holes and boreholes that may be uncovered during mining and reclamation activities will be permanently closed unless approved for water monitoring or otherwise managed in a manner approved by the Division.

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